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ABSTRACT

Intended for individuals involved in research policy and funding in England's higher education system, this HEFCE report is a fundamental review of research policy and funding in the context of several issues addressed by the 1996 Research Assessment Exercise (RAE). The report summarizes conclusions reached by the committee enjoined to oversee HEFCE's review process. HEFCE indicates in its key findings that on many measures, UK's researchers are globally among the best. Also contained within the report's key findings is the recommendation that current arrangements for funding should remain intact, with key reform areas. Grant protection should be retained for top-rated departments. A proposal is made for a new capability development fund. RAE peer review panels should recognize diversity within research. Institutions should meet minimum standards for post-graduate training, and link staff development to research funding provided by HEFCE. Appendices A through M present data on various factors within the research funding process. (HB)

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September 00/37
Consultation
ED 446 462

Respond by 8 December 2000

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Review of research

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Foreword

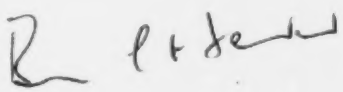
This is the first review of research policy and funding to have been conducted by a funding council in England for many years. It represents a huge effort, in which many people have been involved. The main committee and its five sub-groups included nearly 50 people, and many hundreds more have been engaged in the 40 or so discussions and consultations during the course of the review. I am grateful to all who have contributed, some of whom have put in a great deal of work. As a result of this, we have produced a report which I believe is authoritative, comprehensive and above all is backed up by evidence. This report puts us in a good position to move forward with the consultation, and subsequently to decide policy for the future.

It is clear that we have an outstanding research base in this country. There is both internal and external evidence for this, which is set out clearly in the review. Original thought and research are activities in which this country excels – some of the world's greatest thinkers and innovators have been British, through history to the present day. We have to ensure that the conditions are right for them to continue to flourish. The review provides some clear steers on future investment.

Past policies for the funding and assessment of research have provided an environment for our research base to thrive. However, there are issues which need to be addressed so that this continues to be the case: the environment is changing constantly, and we have to ensure that our policies evolve. This report has identified a number of such issues, and has made a number of radical proposals for change; there is, for example, a particular focus on research staff and students.

The report is now published for consultation. Through the autumn and early winter, we will arrange a number of consultation seminars and seek comments and views about the analysis and conclusions of the report from all interested parties. Following this, the HEFCE Board will decide on its future funding policies and, jointly with the other funding bodies, we will consider the future conduct of the Research Assessment Exercise, beyond the 2001 exercise.

We have established a dedicated web-site at http://www.hefce.ac.uk/research that hosts all the material generated as part of the review: sub-group reports, consultancy studies, and details of meetings and other working papers. It also hosts a library of other relevant material to help respondents formulate a reply to the recommendations that have been made. May I encourage you to participate in this consultation so that the recommendations made to the HEFCE Board early in 2001 do properly represent the experiences and expertise of those with whom we work.



Sir Brian Fender
Chief Executive, HEFCE

Review of research

To	Heads of HEFCE-funded higher education institutions
Of interest to those responsible for	Research policy and funding
Reference	00/**37**
Publication date	September 2000
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Executive summary

Introduction

1. The HEFCE's fundamental review of research policy and funding arose out of earlier plans to review the Research Assessment Exercise (RAE). After the 1996 RAE the four UK funding bodies consulted widely on whether the RAE continued to provide a sound basis for the distribution of research funds. It seemed to the funding bodies that – notwithstanding the very strong response in favour of the RAE – the rapidly changing research landscape, increasing globalisation of research and significant national and regional developments required that a more fundamental review should be carried out. It was agreed that each of the UK funding bodies should conduct their own wider ranging reviews of research policy and funding, before the question of the future of the RAE was addressed jointly. The HEFCE's review was overseen by a committee, whose membership is at Annex A. This report summarises the conclusions of the committee, who are referred to throughout this document as 'we'.

2. In some instances issues identified by the committee have been acknowledged in the Government's recent Spending Review. This has resulted in the investment of additional public and non-government funding on research infrastructure, research student stipends and measures to enhance innovation and knowledge transfer. While we welcome this very significant increase in funding, we consider there is a need for continued and coherent investment of this type in these and other key areas in order to sustain the competitiveness of the HE research base in the future.

3. The recommendations of this report are now the subject of consultation. Specific questions arising from the recommendations are listed at Annex M. In order to aid the

preparation and submission of responses, a consultation web-site has been established at www.hefce.ac.uk under 'Research'. This includes electronic versions of all the reports prepared to inform the review, a library of related material, and a form for electronic submission of responses which will facilitate their analysis. Responses are invited by 8 December 2000.

Key findings

4. We believe that the HEFCE's guiding principles for research funding have helped to underpin the success of the country's academic researchers. On many measures UK academics remain among the best in the world. Where problems have arisen, this has been the result of the inadequate level of overall research expenditure rather than the organisation, or basis, of research funding. In our review of research policy and funding, we have therefore sought firm evidence of areas where improvements are needed before recommending any changes.

5. After reviewing and commissioning an extensive array of evidence, we have concluded that the HEFCE's present arrangements for research funding should stay broadly intact. We believe that funds should continue to be allocated selectively to higher education institutions (HEIs) on the basis of research quality ratings produced in the RAE.

6. But we also propose a number of radical reforms. These respond to the concerns and needs of stakeholders which have emerged over the 15 years since the current research funding framework was established.

a. We recommend that the policy priority ought to be to protect grants for top-rated departments, but a consequence of this is that additional funds will probably be needed after the 2001 RAE to allow improved departments to benefit from their enhanced performance.

b. We propose a new capability development fund to enable the Council, through institutions, to respond to strategic needs, including at the national, regional and local level.

c. We conclude that RAE peer review panels should recognise greater diversity in the characteristics of research excellence which distinguish different disciplines, and we propose measures to further encourage applicable research.

d. We propose that academic institutions should be required to meet agreed minimum standards for postgraduate training, and be required to provide staff development plans before receiving HEFCE research funds.

7. Taken together we believe that these proposals will create a new funding environment which will underpin the future success of the country's academic research community and its ability to meet the needs of other stakeholders.

Research funding

8. We believe that the HEFCE should continue to allocate research funds selectively, by subject, on the basis of the quality of research in that subject, and should not seek to concentrate funding in a limited number of institutions. We remain unconvinced by arguments for limiting research funds to a few research-intensive institutions. We have also concluded that considerations of 'critical mass' should play no part in decisions about allocations by the Council.

9. We found no convincing causal evidence to support the suggestion that the performance of the research base overall would be further improved if funding were provided only to top-rated departments. We conclude that the present levels of selectivity are about right, and lead to the appropriate spread of research funds between institutions to maintain dynamism and diversity. The current system allows world-class research to stay at the cutting edge and militates against complacency, but at the same time enables new subjects and new centres to flourish. The evidence shows that the UK system is more, not less, selective than that in the US.

10. However, unless there is extra money from the Government to reward any continuing general improvement in research ratings in the 2001 RAE, funding will have to be more selective in order to protect the resources of top-rated departments. If funding constraints force an increase in the gradient of selectivity, it would be at the expense of the enormous strengths shown in the rest of the sector. Such a move would choke off essential seed corn

funds for developing research groups, developing research areas and collaborative research endeavours. We also propose that high-performing departments are allocated specific funds to support formal collaborations with centres of excellence in other countries.

11. We recommend that there should be no more, but not significantly fewer, than the present number of subject areas (units of assessment) in the RAE. The HEFCE should also continue to allocate its research funds between subjects formulaically and should not seek to exercise policy judgements about this. But in determining subject budgets we propose that the Council should take account of the relatively lower level of project funds provided to the arts and humanities compared with other subjects. It is also time, we believe, for the HEFCE, with the other direct funders of the Arts and Humanities Research Board (AHRB), DfEE (as the ultimate source of much of its funding) and OST (as the major provider of public research project funding in other areas), to explore further the question of whether the AHRB should be formally established as a Research Council.

Research assessment

12. We recommend that there should continue to be a research assessment process, based on peer review, that builds on the solid and accepted foundations of the RAE.

13. We conclude that a number of criticisms of the RAE are based on false perceptions of various aspects of the exercise. Some academics continue to believe, for example, that the number of publications produced is an influential factor in determining RAE scores, despite the fact that panels are given no information about the number of publications produced by individuals or departments. And there remains a widespread view that interdisciplinary work is generally disadvantaged by the RAE processes, despite robust evidence to the contrary.

14. The HEFCE needs to make increasing efforts to provide information about the workings of the RAE, and to ensure that the sector understands the criteria used in making judgements in the exercise, and has confidence that these will be adhered to by the panels.

15. The RAE is sometimes criticised as an expensive exercise. Relatively speaking, it is not. A thorough review of the full costs of the RAE in one institution has been undertaken. If extrapolated to the sector as a whole, the cost amounts to 0.8 per cent of the total funds allocated on the basis of the assessment.

16. We recognise the concern in some quarters that the RAE promotes and distorts staff movement. However, having reviewed the evidence, including comparisons with other countries, other sectors and the period before the operation of the RAE, we do not believe that the RAE has created a major problem of staff movement. Indeed, the evidence indicates that the extent of movement overall is rather low, among all grades of staff in all types of institution, and possibly so low as to be inconsistent with maintaining dynamism in the sector. It is lower than that which occurs, for example, in the US or in some industrial research laboratories.

17. We believe it is right that one of the primary drivers of research funding should remain the quality of research, and that the RAE should continue to be solely concerned with quality. We do not accept that research should be marked up because it is deemed to be 'useful', or marked down because it is deemed not to have potential for application. However, there is no dichotomy between quality and applicability: what is required is for high quality research, in all its manifestations, to be recognised as such by the RAE panels in their criteria and assessment processes. We consider that the HEFCE should consider further how to ensure that users are able to engage fully with the assessment process.

18. In addition, we propose that, in their submissions to the RAE, HEIs should be allowed to describe activities in terms that recognise the different characteristics of research excellence in different subject areas. This might mean that in physics or chemistry, for example, impact factors and citation information might play a part; whereas in history more attention might be paid to longer-term scholarly activities such as the editorship of dictionaries or bibliographies. We also recommend that where combinations of disciplines are judged to have given rise to a new discipline, which has

achieved maturity, then consideration should be given to creating a new unit of assessment.

Impact on other activities: teaching, business links, capability development, research facilities

19. One criticism of the present funding arrangements is that they encourage academic staff to devote too much attention to research at the expense of other activities, such as teaching and the transfer of knowledge outside higher education.

20. We do not believe that the answer to maintaining motivation and reward for other activities is tinkering with the process of research funding or assessment: that would be to act on the wrong instrument. Rather, it is necessary to create other and parallel reward systems so that academic staff and their institutions see incentives to put their effort into activities other than research, in which they might have greater strengths or can add more value.

21. A key function of academic institutions is to conduct research which can be taken up by industry and the community and used to develop products and services. We recommend that the HEFCE should discontinue the generic research (GR) funding stream, provided to institutions in respect of their success in securing collaborative contracts from industry. An evaluation of GR funding suggests that it lacks the size and focus necessary to produce the benefits initially envisaged. We also urge a substantial and sustained boost in funds for the Higher Education Reach-out to Business and the Community (HEROBC) programme, intended to encourage knowledge transfer more generally, from the current level of £20 million per annum. The additional £80 million of funding announced in the Spending Review to support HEI-industry links over the financial years 2001-02 to 2003-04 is extremely welcome. But if it is to affect individual and institutional behaviour significantly it must become a sustained and credible alternative source of funds to support and embed this third mission as a core activity within HEIs.

22. If academics and academic managers are to make serious choices between the different activities open to them, then HEROBC will also need to be allocated in a more focused way, and we recommend that the HEFCE and its partner in the scheme, the Department of Trade and Industry, should consider this.

23. Most academics argue that good research is necessary for good teaching. However, there is a difference between academics being engaged in creating new knowledge themselves, and being alert to developments in their subject, including new discoveries, so that they can interpret and reinterpret the knowledge base of their subject to inform their teaching. Teaching needs scholarship and scholarship depends on, and is distinct from, research. What is required is for all teaching to be animated by scholarship and for scholarship in turn to be informed by research. We propose that the HEFCE should make it clear that its funds for teaching include an element intended to support scholarship.

24. We also propose that the Council should create a new stream of funding to supplement the existing researcher-driven and user-driven funding streams. This 'capability-development' funding should be provided to institutions in response to their proposals for the strategic development of their research effort. The HEFCE can then, through institutions, respond to national, regional and local needs.

25. In recent years, there has been increasing concern about the deteriorating state of HEIs' research facilities and buildings. We urge the Council to consider ways of modifying its funding method to remove incentives to recruit research staff and students at the expense of appropriate investment in research infrastructure. And we call for additional recurrent funding for research infrastructure, which should be earmarked for this purpose. The £1 billion of additional infrastructure funding announced in the Spending Review is extremely welcome and will build on the contribution of the Joint Infrastructure Fund (JIF) in providing a dedicated source of funding for

investment in research facilities. However, we consider that a recurring stream of research capital funding needs to become a permanent feature of the funding landscape if the research base is to maintain its competitive advantage and not deteriorate in the future.

26. We recommend that the HEFCE should no longer include an element which recognises income from charities in calculating the allocations to each subject. Nor should it continue to quality weight funding allocated to institutions in recognition of work undertaken for charities. Instead, it should seek to agree an explicit basis of support which reflects the contribution that charities make to the direct costs associated with projects. The Council should also consider whether it is necessary to amend the funding model to explicitly recognise that grants and contracts from the EU do not meet the full costs of the activities they sponsor.

People issues

27. We paid particular attention to questions concerning the development needs of academic staff and research students. We endorse the conclusion of the 1996 Harris report that research students are entitled to work in a high quality research environment, supervised by experienced researchers, and with close attention paid to their career needs.

28. Given the importance of this issue for the sustainability of the research base, and for a continued flow of highly trained individuals to meet the demands of industry and society more generally, we propose that the HE funding bodies, with the Research Councils, industry, charities and other interested bodies, should develop minimum criteria for postgraduate research training. These would apply equally to all institutions, and be applied as a condition for the receipt of funding for research students. Adherence to these criteria would be judged in future RAEs after 2001.

29. Some academics have raised serious concerns that the RAE may provide disincentives to institutions to recruit staff without an established research record, in particular disadvantaging young academics, women who have taken a career break, and those who are embarking on academic life in mid-career.

30. As far as young people are concerned, the evidence provided by the analysis of staff returned to the last RAE suggests that, whatever the apparent disincentives, the recruitment behaviour of institutions has not discriminated against such staff.

31. However, we welcome the commitment of the HEFCE, and of the sub-group examining the development of research people, to investigate further the reasons behind the relative under-representation of women in the highest-rated departments revealed by this review.

32. A particular change to the RAE which we recommend is that institutions should be allowed to provide personal statements for staff who, for whatever reason, are unable to submit other evidence of the quality of their research, such as publications. This should be of particular benefit to, among others but not exclusively, women who have taken a career break and staff entering the academic profession either for the first time, or re-entering after a period pursuing an alternative career. Changes to the 2001 RAE, which permit explanation of staff circumstances should help in this respect, but the change we propose would go further to ensure equality of opportunity.

33. As stated above, we believe that research training is a key indicator of sustainability and therefore warrants more explicit recognition in the assessment process and funding model. Research training should be the subject of a separate assessment, but linked to the RAE, to establish whether agreed minimum standards have been reached. These would cover, for example, the facilities available and the quality of the environment in which the student works. As part of the assessment process, RAE panels would judge whether a department met the minimum criteria. Funding provided by the HEFCE for postgraduate research training should be calculated and identified separately from the funding provided for research activity, and could be withheld if the minimum standard was not reached.

34. Collaborative arrangements should be established to enable units to meet all aspects of the postgraduate training requirements where they might not be able to do so alone.

35. Another issue raised about postgraduate research training is the number of PhDs being awarded by HEIs. We propose that the capability-development stream of funding should seek to ensure adequate PhD output in subjects where there have been shortfalls in PhD recruitment. We welcome the increase in research student stipends announced in the Spending Review. However, if the brightest and best students are to continue to be attracted to acquire research skills, whether or not they subsequently pursue an academic career, we must also provide financial support to institutions to maintain and develop the quality of their provision.

36. We propose that all institutions should adopt staff development strategies so that the issues identified in this report, and human resources questions more generally, are addressed systematically. This aspect of research policy should feature prominently in the assessment and funding process. Institutions should be required to submit a staff development strategy as a precondition for the release of research funding.

Background

The review's beginnings

37. The HEFCE's fundamental review of research policy and funding arose out of earlier plans to review the Research Assessment Exercise (RAE). The RAE is the process jointly employed by the UK's four higher education funding bodies to determine the quality of research in academic departments. It is conducted every four to five years: the last exercise was in 1996, and the next one will be in 2001.

38. After the 1996 exercise, the four funding bodies consulted widely on whether the RAE continued to provide a sound basis for the distribution of research funds to universities and colleges. After 10 years in operation, it was believed to be time to consider whether the assessment should continue after 2001, or whether it had outlived its purpose.

39. The consultation revealed a very strong response in favour of continuing with the RAE. But in view of national and international changes in the research landscape, the funding bodies decided that a more fundamental and wide-ranging review of research policy and funding should be undertaken. The funding bodies agreed to undertake their own reviews of research policy and funding before the 2001 exercise, to ensure that views from higher education institutions (HEIs) and other stakeholders about potential changes were not operationally or philosophically constrained by plans for a future exercise. The HEFCE's review was undertaken by a committee, whose membership is at Annex A. This report summarises the conclusions of the committee, who are referred to throughout this document as 'we'.

Why should Government fund research?

40. Research is one of the key functions of HEIs, alongside teaching and scholarship, and knowledge transfer. The country needs high quality research to maintain its competitive edge and standing in a world where knowledge is changing rapidly. Much has been written about the knowledge economy, and we will not repeat it here.[1]

41. The case for public investment in research also seems to be clear. Government funding is needed for research which is unlikely to be funded by others, but which offers the possibility of creating new knowledge which is later made available to others to exploit. A study commissioned by the HEFCE and CVCP (the representative body for UK universities) suggests that the rate of return for public investment in research could be upwards of 25 per cent per annum.[2]

42. Particularly important is the need to build on the success of academics in working alongside industry and commerce to produce research that contributes to the economic development of the country, and that is of interest to other users and partners to enhance the health and social development of the nation. One dimension of this positive relationship is illustrated in Figure C1 which shows that the correlation in the UK between public funding provided to institutions and investment by the private sector is high in absolute terms, and higher than in the US (Figure C2). This is not just a size phenomenon: as Figure C3 illustrates, in the UK industrial funding per member of staff returned to the RAE increases as total R&D funding increases. Figure C4 shows that there is generally a positive relationship between research quality (as judged by bibliometric impact) and industrial funding; this is particularly noticeable in the medical and biological sciences, engineering, chemistry, physics, and computer sciences and is also present in some of the social sciences.

43. The UK research base maintains a pool of knowledge and expertise on which the country can rapidly and effectively draw, and which provides access to the work of researchers overseas. The UK undertakes only 9 per cent of the world's research effort[3] (funded by 4.5 per cent of the world's research expenditure[4]), and access to the other 91 per cent requires credibility if overseas peers are to share knowledge with us.

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1 Salter A, D'Este P, Martin B, Geuna A, Scott A, Pavitt K, Patel P, Nightingale P, 2000, 'The Impact of Publicly Funded Research on Innovation in the UK', Science and Technology Policy Research, University of Sussex (SPRU).

2 Op Cit.

3 ISI Data. The figures reflect the UK share of all global research output.

4 Figures from UNESCO and Eurostat.

44. There is other research, in the arts and humanities in particular, from which academics and others may develop a deeper understanding of the world and its culture, not directly utilitarian in its benefits, but nonetheless necessary in a civilised society.

45. Publicly-funded research is also vital to provide an environment in which individuals who subsequently leave academia to pursue careers outside HE can be trained in scientific and technological skills. In an increasingly knowledge-driven world, it is essential for the nation's competitive standing that it has a highly skilled workforce who are able to manage the increasing penetration of research and technology into all aspects of our lives, and the increasing speed to market of scientific discoveries. An important part of this report is devoted to proposals to change the basis on which public funding is provided for the training and career development of researchers.

46. The present arrangements for funding research have helped to create a research base which is highly successful in international terms. Research carried out for the review, as well as work done previously, bears witness to the depth and strength of this country's research effort. Whether measured in terms of the number of papers published, and the impact of the research (Table D2), international prizes won[5] or the gearing of private to public funding (Figure C3), the UK performs well on the international stage in a wide range of subjects.

Our definition of research

47. For the purposes of this review we have taken research to mean activity which pushes forward the frontiers of knowledge, whether it be in sciences, technology, arts, humanities or the social sciences. This will involve making new discoveries, but, particularly in the humanities, it may involve reinterpreting and developing fresh insights from existing knowledge. There are, of course, alternative definitions; but for the purposes of this review, which is concerned solely with the HEFCE's own research policy and funding, we believe that this succinct definition is appropriate.

The different sources of funding for research

48. Researchers have multiple sources of funding. The largest single source, but a minority of the total, is provided by the higher education funding bodies. In 2000-01 the HEFCE allocated £867 million through its quality-related research (QR) funding stream. The purpose of these funds is to allow academic institutions to build up their basic research infrastructure. This provides the bedrock from which academics can make choices over the direction of their research, including developing research to the point at which a proposal for support can be made to funders for specific research projects. HEFCE funds also support the training of postgraduate research students.

49. The Research Councils provided £466 million to universities and colleges in research project grants in 1998-99.[6] In addition they provide other types of support to the HE research base more generally, totalling about £500 million if Medical Research Council units are included.[7] In 1998-99 (the last year for which information is available) academic institutions secured £1,039 million for research from other sources, including charities, industry and government departments. For the most part this public and charitable funding is provided as grants to support specific proposals.[8]

50. Funds from the private sector are generally provided to institutions as research contracts, primarily on a customer to contractor basis,[9] for the

5 Office of Science and Technology (OST), 1997, 'The Quality of the UK Science Base', Department of Trade and Industry.

6 HESA, 2000, 'Resources of Higher Education Institutions 1998/99'.

7 Expenditure over and above this £466 million includes: postgraduate studentships £145 million, fellowships £28 million, national facilities £98 million and international facilities £130 million.

8 This form of funding, although it may be the subject of a contract, is generally collaborative in nature, supporting research for the public good.

9 It is recognised that the customer-contractor relationship is changing, and increasingly involves greater partnership and collaborative activity, and is not one dimensional.

conduct of research with specific outcomes sought by the customer. Some public funding is also provided on this basis, primarily research commissioned by government departments to meet particular needs.

The dual support system

51. Funds provided by the HEFCE and those provided by the Research Councils together comprise the 'dual support system' of public research funding for HEIs. As part of the review, we found that virtually all research funding systems in the world, including in the US and in corporate laboratories, involve a form of dual support.[10]

52. The two legs of the dual support system are very different in their purpose and philosophy, but complementary in their effect. The Research Councils have well developed missions and identified national priorities for deploying research funds. In part, research proposals will be sought and assessed against these priorities and policies, subject always to the over-riding consideration of the quality of the research.

53. Grants are provided by the HEFCE on an entirely different basis, without strings or explicit goals in mind, other than to support high quality research. These are funds allocated not to individual researchers or research groups, but to the institution, to be used at its discretion. Institutions use these funds to build up their capability in the areas which will enable them to win grants and contracts from Research Councils, industry and other research users.

54. A key feature of the HEFCE's research funding method is that it does not determine the nature of research activity. These are judgements for institutions and individual academics to make; it is clear that much of the success of the UK research base is due to the targeted investment of resources by institutions in pursuit of well thought out strategies. In this report we make proposals to help institutions to build research capability where there has been 'market failure'.

55. There is a complementarity and synergy in the dual support approach which has served the country well. National and industrial priorities are set by Research Councils, government departments, charities and industry. HEIs receive grants from the HEFCE allowing them to build up capability in areas prioritised by these project funders, which they must do if they wish to secure the majority of the funds available for research. Nevertheless, there is scope for them to exercise their judgements and set their own strategic priorities, and to undertake speculative research which has not yet been developed to a point where it can be supported, or even described as a proposal. The present arrangements provide a plurality of decision and funding points, which is a source of great strength.

Current research funding method

Determining the amount provided for each subject

56. The majority of the HEFCE's research funds are provided as QR funding divided between 69 subject areas, or units of assessment (it will be 68 for the 2001 RAE).[11] In 1998-99, QR funding was £804 million, 97.6 per cent of total HEFCE research funds. Each subject is assigned to one of three cost weights and these are multiplied by the volume of research activity in each subject to work out the total funding for that subject.

57. The three cost weights are:

A	high cost laboratory and clinical subjects	1.7
B	intermediate cost subjects	1.3
C	others	1.0

58. The volume of research in each unit of assessment is calculated using five separate components. These volume components are weighted as follows:

- research active academic staff – 1 x number of full-time equivalent (FTE) research active academic staff funded from general funds in departments rated 3b or above, selected by institutions for assessment in the RAE,

[10] Nature and purpose sub-group report paragraphs 26-27. See also Millar, J and Senker J, 2000, 'International Approaches to Research Policy and Funding: University Research Policy in Different National Contexts', SPRU/HEFCE.

[11] HEFCE 4/97, 'Funding method for research from 1997-98'.

- research assistants – 0.1 x number of FTE research assistants
- research fellows – 0.1 x number of FTE research fellows
- postgraduate research students – 0.15 x weighted number of postgraduate research students in their second and third years of full-time study, or third to sixth years of part-time study
- research income from charities – each £100,000 of income from charities is treated as equivalent to an FTE research active member of staff.

59. The number of research active academic staff is the most significant volume element; it accounts for about two-thirds of the total.

Distribution of the subject totals between institutions

60. The volume of research for each institution in each subject is measured using the same indicators as above. The subject totals are distributed to institutions in proportion to the amount or volume of research, multiplied by the quality of research in that subject for each institution. Funding is therefore proportional to volume x quality.

61. The quality of research is assessed by peer review in a Research Assessment Exercise (RAE) conducted every four or five years. The last RAE was conducted in 1996 and will inform funding decisions until 2001-02. The next assessment will be in 2001. The RAE is the largest single research assessment exercise in the world, involving over 55,000 academics, around 3,000 departments and almost 200 institutions.

62. In the last RAE, each institution was awarded a rating, on a scale of 1 to 5* (five star), for the quality of its research in each unit of assessment in which it made a submission. The table below shows how these ratings relate to the HEFCE funding provided. Ratings 1 and 2 attract no funding, and from 3b upwards each rating attracts 50 per cent more funding than the one below, except 5* which attracts 20 per cent more funding than a 5 rating. This means that a unit with a 5* rating attracts approximately four times as much funding as one with a rating of 3b for the same volume of research activity. As a result, funding of research is highly selective. In 1998-99, 75 per cent of HEFCE research funds went to 26 HEIs.

Rating	Weight
3b	1
3a	1.5
4	2.25
5	3.35
5*	4.05

The review

63. The committee for the review began meeting in June 1999 and initially established four sub-groups to look at particular issues.

64. The groups covered:

- the role of selectivity and the characteristics of excellence
- the nature and purpose of HEFCE funding
- the role of quality assurance and evaluation
- the relationship between teaching, research and other activities.

65. A fifth committee was subsequently established specifically to address 'people', or human resources, issues such as equal opportunities.

66. The main committee and its sub-groups met regularly until early summer 2000, when a report to the HEFCE Board was prepared. That report forms the basis of this consultation document. The consultation exercise will run until 8 December 2000 and will involve HEIs, industrial and other commercial organisations, charities, government departments and other stakeholders. There will, subsequently, be a group jointly established by all the UK funding bodies to review the future of the RAE.

67. The HEFCE review has been wide-ranging and evidence-based, with a variety of methods employed to engage fully with HEIs, learned societies,

industry and other users, and other stakeholders. In September 1999 a call for evidence was issued to interested parties and the responses informed the review committee and its sub-groups in making their proposals.

68. A series of 30 meetings was also conducted with a variety of stakeholder groups, and research studies were commissioned in the following areas:

- resource allocation and research performance: the assessment of research
- assessment and the changing nature of research
- how the Research Assessment Exercise has changed the research base
- international approaches to research policy and funding
- regionality
- collaborative approaches to research
- the role of selectivity and the characteristics of excellence
- the interface between teaching, research and other activities.

Details of the sub-group reports and consultancy studies are given in Annex B.

69. Responses to the call for evidence, details of stakeholder meetings, final reports of the consultancy studies and a library of other on-line material relating to issues addressed by the review can be found on the HEFCE web-site www.hefce.ac.uk under 'Research'.

70. The review's main conclusions are given in the executive summary above. The bases for the conclusions and recommendations are elaborated below under the following headings:

- principles and purposes of funding research
- the Research Assessment Exercise
- the impacts on other activities
- people issues.

71. A summary of all the recommendations arising from the review is shown at Annex M, along with the consultation questions.

72. A more discursive account of the thinking underpinning the conclusions and recommendations of the committee can be found in the report presented to the HEFCE Board at its meeting on 15 June 2000. This, along with reports from each of the four sub-groups established at the beginning of the review can also be found on the web at www.hefce.ac.uk under 'Research'.

Next steps

73. The consultation period will run until 8 December 2000. The consultation web-site contains links to relevant evidence and a template for responses. We believe it is in the interests of the HEFCE and respondents that views on the recommendations in our report are articulated clearly and coherently in order that they may best inform the development of future policy. Respondents may therefore wish to take advantage of this facility.

Principles and purposes of funding research

74. On many measures, UK researchers remain among the best in the world. As illustrated in Table D2, they rank first in the world, for example, in terms of the numbers of publications and citations generated per million dollars spent on research. In terms of the numbers of papers produced per researcher, they are among the top five nations.

75. The review has reinforced our view that the HEFCE's guiding principles for research funding have contributed to this success. Where problems have arisen, they have been caused by low levels of overall research expenditure rather than by the organisation, or basis, of research funding (see Table D1). We have therefore sought firm evidence of areas where improvements are needed before recommending any changes.

76. At the same time, there is no room for complacency. The global research base is becoming increasingly competitive; globalisation has prompted many UK-based companies to move their headquarters to other countries; and, as shown in Table C1, UK industry invests a lower proportion of its income on in-house research than industry in most other OECD countries, thus reducing its ability to 'pull' from the research base. Also, despite improvement in recent years, knowledge transfer activities vary in effectiveness across the HE sector.[12]

Selectivity and concentration

77. A key objective of the HEFCE is to promote excellence in research. In doing so it seeks to strike a balance between the twin aims of continuing to support established research excellence, and encouraging dynamism in the sector, allowing both new subjects and new centres to develop.

78. Under the present arrangements, all HEIs may compete for research funding, which is allocated on the basis of the quality of research. This means that virtually all institutions receive some funds for research, but those with research strengths in a large number of subjects receive the lion's share, as illustrated in Figure E1. Although many institutions receive relatively small amounts, this may have a major impact on them.[13] The principle which underpins research funding is that of selectivity based on quality, not explicit concentration in a selected number of institutions.

79. Some have suggested that the HEFCE should adopt a policy of concentration. Limiting research funds to a few research-intensive institutions would focus finite research funds in universities and colleges where high quality research permeates the institution. It might encourage the development of higher quality research: as Figures E2 and E3 demonstrate, large high-output departments tend to be collected together in large high-output institutions, and Figure E6 shows that high research ratings, at least in the sciences and some social sciences, are associated with size.

80. However, we found no convincing causal evidence to suggest that a policy of concentrating research funding in a limited number of institutions would lead to an improvement in research quality overall. The RAE has revealed high quality research in a very large number of institutions: 59 institutions have one or more 5* rated departments, and 87 have a department rated at least 5. In some cases, these are isolated pockets of excellence in institutions that do not otherwise have overall research strength. Clearly, if research funding were to be much more limited, it would choke off significant amounts of current and future world-class research.

81. Lower-rated departments may also include some groups of international standing. Our research shows that some lower-rated departments attract similar levels of external funding per research active member of staff as highly-rated departments, though the average overall is lower. As Figure C3 shows, the leverage effect of small amounts of public funding is considerable.

[12] HEFCE 98/70, 'Industry-academic links in the UK'.

[13] Some responses to the call for evidence have been mounted on the web at www.hefce.ac.uk, under 'Research'. See also JM Consulting Ltd; CHES, Institute of Education, University of London; Commonwealth Higher Education Management Service; Higher Education Consultancy Group, 2000, 'Interactions between Research, Teaching and Other Academic Activities', HEFCE.

82. Concentration would produce only modest financial gains for top-rated researchers. If research funding for the year 2000-01 were limited to, say, 50 institutions, the funds released by the other 80 would only amount to £65 million, adding just 8 per cent to the funding of the top 50. And there would be high risks associated with the withdrawal of funding from some institutions. Not only is high quality research extremely widespread, its emergence is not predictable. Also, small amounts of research funding can have a large impact on an institution: it can bring about transformation in the culture, attitude and motivation of the staff that has spin-off benefits for teaching and other activities throughout the organisation. Table F1 details three types of potential benefit for teaching from research.

83. Research funds are already highly skewed to the research elite. As shown in Table G5, the degree of selectivity, and the consequent concentration of funding, in the allocation of research funds in the UK has increased in recent years. This contrasts with the US where the trend has been in the opposite direction.

84. We thus conclude that all institutions should continue to be able to compete for research funding, and that the HEFCE should continue to allocate research funds selectively by subject, on the basis of the quality of research.

Recommendation: The HEFCE should continue to allocate research funds selectively, by subject, on the basis of the quality of research, and should not seek to concentrate funding in a limited number of institutions.

Selectivity – more or less?

85. At present, the HEFCE does not fund departments rated 1 or 2 in the RAE. Funding for each subsequent point on the RAE rating scale increases in 50 per cent steps, with a final 20 per cent jump between the 5 and 5* grades. At present, a 5* grade is weighted at 4.05, compared with a 3b weighted at 1.

86. Although funds are allocated selectively within subjects, the objective is to calculate the appropriate level of block grant to be provided to an institution. The effect of different degrees of selectivity is therefore best illustrated by observing the changes in overall research funding to institutions. The results of two of the scenarios that were modelled are shown in Figures G1 a and b and G2 a and b. It is clear from this analysis that a large reduction in selectivity would lead to a flow of funds out of world-class research-led universities. On the other hand, a significant increase in selectivity would reduce the number of research-intensive institutions to a level that we consider too small to provide a vibrant UK research base, and would greatly reduce research provision in some regions, benefiting only the South-East and London.

87. For instance, under the most selective scenario explored, the five institutions currently receiving the largest amounts of research funds would gain over £55 million in total, while the following 15 would together lose £30 million: in some instances the individual reductions approach £5 million. These losses are large recurrent reductions in core funding and would dramatically affect the research capability of these institutions.

88. An increase in selectivity would also see considerably steeper steps in the levels of funding associated with each of the quality ratings. This would increase the financial turbulence associated with the RAE, and could make it difficult for institutions to bolster low-scoring departments, as the loss of funding would be so great and the investment required to re-establish them proportionately greater.

89. We have therefore concluded that the present level of selectivity is about right, and leads to an appropriate spread of research funds between institutions.

Recommendation: The degree of selectivity should aim to balance the need to enable world-class research to flourish, with the need to enable new subjects and new areas of excellence to develop.

Critical mass

90. Figure E6 illustrates our finding that there is a generally positive relationship between high research quality (as measured by bibliometric impact) and size. Figures E4 and E5 show that this

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holds both in the UK and in the US. However, this does not necessarily point to a policy of requiring, or even deliberately seeking, a critical mass of research activity. It is just as likely that quality produces size, rather than the reverse: that high quality research leads to increased funding which in turn leads to the recruitment of additional staff and growth in the volume of research activity.

91. We do not believe that the HEFCE should take into account critical mass when making funding decisions. There is no theoretical or empirical reason to suggest that high quality research cannot be conducted in units of all sizes. In fact, Figure E7 shows that there are numerous research groups functioning at the highest levels which are not large.

92. Whatever the relationship or its cause, the present funding arrangements have enabled the largest units to develop where there is high quality, and have enabled most funds to be directed to the largest units. Concentration and critical mass are already occurring as a natural consequence of powerful funding drivers and, as illustrated by Table G4, institutions have shown the ability to respond and improve research without central direction.

Recommendation: Considerations of 'critical mass' should not play a part in decisions about allocations by the HEFCE.

Maintaining support for top-rated departments

93. We propose that the current balance between supporting established and emerging excellence should be maintained. This is not a simple affirmation of the status quo, and has far-reaching implications. Sophisticated modelling has been carried out, making different assumptions about changes in ratings and the volume of research recorded at the next RAE. If there is a continuing improvement in grades at the same rate as in the past, and an increase in the number of staff submitted, almost £60 million of extra resources will need to be found after the 2001 RAE, both to satisfy those departments which have improved to a 5/5* rating, and to maintain the level of funding for those departments which continue to be 5 or 5* rated.

94. If additional funding is not provided and the gradient of the selectivity curve remains the same, the four HEIs currently receiving the largest amounts of HEFCE funding could, between them, lose as much as £5.5 million.

95. However, we have said that our priority is to protect top-rated units. Therefore unless there is extra money from the Government to reward the improvement that is expected to be demonstrated in the 2001 RAE, funding will have to be even more selective. The gradient of selectivity will need to be steeper to protect the funding of top-rated departments. This would reduce the unit of resource for other departments with a substantial component of world-class research, with the risk of seriously demotivating them. Such a move would also be at the expense of the enormous strengths shown in the rest of the sector as it would choke off essential seed corn funds for developing research groups, developing research areas and collaborative research endeavours – compromising the development of the potential top-rated departments of the future.

Recommendation: The HEFCE should aim to increase the amount of research funding available for distribution as QR, in order to allow improving departments to benefit and the funding for 5 and 5* departments to be maintained. If this should prove impossible, then the Council should pitch the degree of selectivity to protect the funding of top-rated departments.

96. While we consider that priority should be given to maintaining the funding of the highest-rated submissions, we believe that funding for 3b and 3a rated departments should continue. These contain significant amounts of good research and, with modest amounts of research funding, support new endeavours and motivate academic staff.

Recommendation: Funding should be retained for 3a and 3b rated submissions.

97. There is no formal process in the current funding approach to identify 'centres of excellence', and Table G2 illustrates our finding that people usually think in terms of exemplars when defining a centre of excellence. On the other hand, the identification of 5* and 5 rated departments goes a long way towards this. In this, England differs from a number of other national systems, and from the European Commission, which is actively considering developing research funding policies based on centres of excellence.

98. In many ways, the funding benefits which might flow to designated centres of excellence already exist in the English system, with the very high funding differentials provided to top-rated departments. We do not see any particular merit in developing policies to focus support further to such departments, except in one respect – international collaboration.

99. As shown by Tables H1 and H2, the extent of collaboration between individual academics is high: a considerable number of research papers are produced collaboratively, including with researchers overseas as shown by Table H3. However, more formal collaborations between departments can be costly to establish and maintain. The HEFCE could set aside specific funds for collaboration with centres of excellence in other countries. Selection might be under the following criteria:

- high quality research over a number of years
- coverage of the whole spectrum of a subject area
- significant size for the subject concerned, to enable effective collaborations
- opportunities for interdisciplinary and multidisciplinary work
- a significant postgraduate population, and possibly a graduate school.

100. One danger is that this would encourage an even stronger focus on departments which have proved themselves to be outstanding, at the expense of pockets of genuine excellence in less highly-rated departments. However, we believe that this is a proposal worth considering. Research Councils already support specific centres, such as the Interdisciplinary Research Centres. Our concern is to ensure that units or departments, as opposed to individuals or research groups, are also appropriately funded to work with their international peers.

Recommendation: Consideration should be given to providing specific funding to high performing units in English HEIs to enable collaboration with centres of excellence overseas.

Number of units for funding

101. At present, both the RAE and the associated funding model are based on discipline based 'units of assessment' (72 in 1992, 69 in 1996, 68 in 2001). It has been suggested that a smaller number of units would be preferable. It would also be possible to have more units for assessment than for funding, with assessment outputs aggregated into larger units for funding.

102. A smaller number of funding units would make the funding method simpler, and funds would be calculated in a less specific way. The benefits might also include better assessment of interdisciplinary research, though some research would continue to cross subject boundaries.

103. However, a disadvantage of fewer, larger, units is that morale, leadership and management in an HEI is not at the level of such large groupings. Moreover, the smaller the number of funding units, the greater the perturbation caused to an institution by changes in the scores of its departments.

104. The destabilising effects of such changes to large units has already been seen in the case of clinical medicine. In the 1996 RAE a fall in ratings in this discipline caused one university to lose almost £1 million in funding. If funding were collapsed into, say, 15-20 units then funding shifts on this scale would happen more often. Our modelling reveals that moving to 12 'super-units' of assessment (detailed in Table G3), would cause a considerable increase in financial turbulence.[14]

[14] Selectivity sub-group report paragraphs 44-50.

105. Setting on one side the practical but not insuperable problem of combining different scores in the RAE into a single overall score, we believe that the extreme funding consequences of larger units outweigh the potential benefits of a simpler funding model.

Recommendation: We recommend that there should be no more, but not significantly fewer, than the present number of units of assessment.

Treatment of different subjects

106. The HEFCE's research funds are provided to institutions as a block grant. Indeed, the funds are not strictly 'for' research, but are 'calculated on research-based criteria'. How they are spent by institutions need not bear any relation to how they are calculated, and the relative crudeness of the method is predicated on the fact that institutions will not simply mirror the calculations in their own internal allocations. The method is, however, considerably less crude than in many other countries where funding is based essentially on student numbers without regard to the cost of activities (see Table 13).[15]

107. Therefore, the fact that sciences often need expensive equipment and the humanities generally do not is not strictly relevant to the question of how funds should be allocated. It would be relevant if funds were expected to be spent strictly or even largely as they are allocated. But they are not. It is a block grant that is being calculated, not a cost or expenditure mechanism.

108. On the other hand, institutions which do not use resources wisely may find that their research performance suffers, and future research assessments will penalise them. If an institution uses resources provided as a result of the funding calculation in respect of one subject on another, then they run the risk of losing resources following the next assessment, unless the beneficiary of the funding has performed strongly. The expectation is that in developing a coherent and effective strategy, institutions will invest in their areas of strength, where they have won funding, but will also seek to develop new areas, or bolster critical but failing areas. It is this effective institutional decision making that the RAE and the associated funding model seek to promote.

109. For these reasons, therefore, discussion of whether different selectivity regimes should be applied to the funding of different subjects is not strictly relevant.

Basis for dividing research funds between subjects

110. At present, the distribution of funding for research between subjects does not include any explicit consideration of policy, nor any judgements about the desirability of spending more in some areas and less in others. Distribution is formulaic, based on the relative costs of different subjects and the amount of research carried out, or volume.

111. In 1998 the HEFCE commissioned a study to inform a consultation[16] on whether funding to different subjects should remain determined effectively by decisions made by institutions about the recruitment of academic staff in different subjects – which itself is largely determined by student demand. Should the fact that more students are coming forward in, say, art and design necessarily lead to an increase in grant for research in art and design? The consultation also sought views on whether the HEFCE could, or should, prioritise allocations to particular subjects.

112. Responses overwhelmingly indicated that there was no case for an explicit policy judgement to determine the size of subject budgets. We believe that this remains the correct conclusion. Subjects which are newly popular among students should benefit from increases in research funding. In general, an expanding subject requires an expanding research base.

113. Also, the Council's grant is allocated as a block grant, and institutions exercise their own judgements about the use of the research grant, if only at the margins. The basis for its calculation should not dictate the way it is deployed.

[15] Geuna A, Hidayat D, Martin B, 1999, 'Resource Allocation and Research Performance: the Assessment of Research', SPRU/HEFCE.

[16] HEFCE 98/54, 'Research funding: introduction of a policy factor'.

114. HEFCE funds represent around one-third of the total funds for research allocated to academic institutions. They also are distinguished from other more targeted funds, by being 'non-directed', used in any way which the institution sees fit, unlike funds from Research Councils, government departments, charities, and industry which are closely directed.

115. The Research Councils establish priority areas for research funding. Similarly, industry will provide funds for research in areas which have direct and more immediate benefit. To win resources from these other sources, institutions have to build up capabilities in the areas in which these funds are provided. When the HEFCE calculates the research volume in different subjects, this will reflect the priority attached to different subjects by other funders and will lead to increased HEFCE funding for those areas.

116. The mechanisms therefore already exist to steer resources to different subjects according to the priorities and policies of project funders, but they are indirect and relatively subtle. Since the HEFCE's research funding is allocated as a block grant, there is scope for institutions to exercise their own judgements about investment and follow their own strategic priorities for the future. The present arrangements allow a variety of judgements to be exercised about these matters, but there are strong drivers for institutions to reflect nationally determined priorities, and for these to be reflected back through the institutional allocation of funding from the HEFCE.

Recommendation: The HEFCE should continue to allocate QR funding between subjects formulaically and should not seek to exercise policy judgements about this.

117. However, we believe there are some aspects of the subject funding allocations which need to be reassessed regularly. The formula for allocating funds between subjects is based on two factors: quantity (volume) and relative cost. There may be a degree of circularity here, with institutions' returns on how much they have spent simply reflecting how much they have received in respect of each subject. The HEFCE should therefore periodically review the relative costs of different subjects, not only on the basis of returns made by institutions, but on the basis of all the available evidence.

Recommendation: The HEFCE should regularly review the relative costs of different subjects, and make any necessary adjustments to the price bands in the funding method.

118. In addition, it should be noted that in paragraphs 176-186 below, we propose the creation of a new strategic fund, to encourage the development of new areas of research which might require additional stimulus and which might not develop appropriately under the existing method.

119. Another area that needs further examination is the funding of arts and humanities subjects. We welcome the creation of the Arts and Humanities Research Board (AHRB), and applaud the HEFCE for taking this initiative. But while other subjects are able to benefit from large Research Council budgets, the project funds available through the AHRB do not provide equivalent levels of funding for arts and humanities subjects. We propose that the HEFCE take this into account in determining the total funding for each subject.

Recommendation: The HEFCE should take into account in determining subject budgets the relatively lower level of project funds provided to arts and humanities subjects by the AHRB, compared with the grants from Research Councils to other subjects.

120. We believe that the AHRB has over the past 18 months demonstrated its efficiency and effectiveness, and shown the benefits of providing dual-support funding across the research landscape. We recognise that in its plans to become a company limited by guarantee it will reduce its dependence on its parent organisations. We believe that it is now timely for the HEFCE, with the other direct funders of the AHRB, DfEE (as the ultimate source of much of its funding) and the Office of Science and Technology (OST) (as the major provider of public research project funding in other areas), to explore further the question of whether the AHRB should be formally established as a Research Council.

Recommendation: Further consideration should be given to whether the AHRB should be formally established as a Research Council.

Collaboration

121. Collaboration is essential to research. There is wide consensus about this, and there is ample evidence of the extent of collaborative work among researchers. In 1994 for example, 46 per cent of all UK academic papers had two or more authors in different institutions, and the trend is increasing (see Table H2). There is also wide agreement that there are significant dangers in trying to engineer collaboration between researchers through funding incentives. The European Commission has attracted widespread criticism for its attempts to do this through its research funding programmes. Fruitful academic collaborations will generally arise spontaneously and where academic benefits can be achieved.[17]

122. We do need to ensure that impediments are not created which might inhibit collaborations. Such impediments could include assessment and funding methods. However, we believe that there is little advantage in creating explicit funding drivers to encourage collaboration.

123. Further, there may be some activities which would benefit from frameworks to enable collaboration, and where more formal funding arrangements may be appropriate. In paragraphs 97-100 we proposed such mechanisms to encourage international collaboration between high performing units in English HEIs and overseas centres of research excellence. In paragraphs 217-218 below, we propose schemes to support collaboration in the delivery of research training to improve the experience for students.

Recommendation: The HEFCE should ensure that its funding and assessment processes do not inhibit collaboration between researchers, and should consider whether to provide support for specific research networks; but there is no case for explicit funding for collaborative research activity in general.

[17] Katz J and Smith D, 2000, 'Collaborative Approaches to Research', Higher Education Policy Unit University of Leeds (HEPU)/SPRU/HEFCE.

The Research Assessment Exercise (RAE)

124. To fund selectively, a basis is required to discriminate between high and low performance. The RAE provides this judgement. Within a subject, HEFCE funding is allocated between institutions on the basis of just two factors: the volume of research conducted in that subject by each institution, and the quality of its research, as measured by the RAE.

125. Although primarily intended to inform the selective funding of research, the RAE has a significance well beyond this. RAE ratings are sometimes used by research students (particularly from overseas) seeking the best research training opportunities. Most HEIs make use of RAE ratings for public relations purposes, while Research Councils use RAE results as a proxy for general resourcing and infrastructure funds, and take them indirectly into account in their assessment procedures. A number of research-led industrial companies also use RAE ratings as a guide to the selection of academic research collaborators and recruits.

126. Introduced in 1986, the RAE has developed into a sophisticated process. One of the most striking features of the exercise, and of the associated research funding method, is the degree of acceptance which they command in the sector. Whatever system is put in place must retain this strength.

127. Assuming that there should continue to be a selective allocation of research funds, the question arises whether a process similar to the RAE remains the best way of exercising judgements about research quality. We commissioned research to identify alternative systems in use around the world, and considered completely new, and radical, alternatives. A summary of some of these and their advantages and disadvantages is presented at Table I1.

128. We believe that although the RAE should be modified in some significant ways over and above those already planned for the 2001 exercise (see Table I2), its advantages outweigh those of the alternatives. We propose that there should continue to be research assessment, based on a peer review process, that builds on the solid and accepted foundations of the RAE.

129. The Higher Education Policy Unit (HEPU) study (*op cit*) demonstrated that the improvement in grades in successive RAEs shown in Tables J2 and J3 has been associated with real improvement in the quality of the research base. However, in order to ensure that research assessment continues to provide a credible benchmark, there must be confidence that improvements in grades reflect real changes in performance.

130. For the 2001 RAE the UK funding bodies are establishing umbrella groups of panel chairs in cognate areas to ensure that panel judgements reflect consistent assessment against the published criteria. Subsequently, international experts will be asked to peer review submissions provisionally identified as meriting the highest ratings, to ensure that the standards deemed by the panels to represent international excellence are appropriate. We believe that these changes will help to assure the quality of the assessment process and that the HEFCE should consider how this additional, partly external, quality assurance could be developed for any subsequent assessment exercise.

Recommendation: There should continue to be a research assessment process, based on peer review, that builds on the solid and accepted foundations of the RAE.

Misconceptions about the RAE

131. There are aspects of the RAE which some regard as unsatisfactory. It is said to distort the behaviour of individuals and institutions. However, after close inspection, we conclude that a number of these criticisms are based on false perceptions of the RAE process.

132. One example is the belief that the number of publications produced is an influential factor in determining RAE scores – despite the fact that panels are given no information about the number of publications produced. Table J5 shows that, in the opinion of international journal editors, there is little evidence that the RAE has a significant distorting effect on publication behaviour.

133. In addition, there continues to be a widespread view that interdisciplinary work is generally at a disadvantage in the RAE process, despite robust evidence to the contrary (see paragraphs 141-142).

134. Although false, such misconceptions could be damaging, because academic staff are likely to act according to their beliefs. It is important that greater efforts are made to address these misconceptions by providing information, both to academics and more generally, about the workings of the RAE.

Recommendation: Efforts should be made at all levels to provide information about the workings of the RAE.

135. More difficult to address is the mistaken belief that, in making their judgements, panels use criteria over and above their published criteria. The requirement in the 2001 exercise that panels should publish and debate their criteria in draft before finalising them has improved things. It is essential for the continued credibility and acceptability of the RAE for the HEFCE to ensure that the sector understands the criteria used in making judgements, and has confidence that these criteria will be adhered to by the panels.

Recommendation: The HEFCE should work to ensure that the sector understands the criteria used in making judgements in the RAE, and has confidence that these will be adhered to by the panels.

Costs of the RAE

136. The RAE is sometimes criticised as an expensive exercise. Relatively speaking, it is not. Returns from all institutions after the last exercise suggest that it cost slightly under £30 million. A more in-depth analysis of costs in one institution extrapolated to the sector as a whole suggests an upper limit for the cost of the RAE of £37.5 million, including opportunity costs.[18] This represents just 0.8 per cent of the total funds allocated on the basis of the results of the exercise.

137. A further criticism levelled at the RAE is that it is a substantial undertaking which does not result in much change to the amount of money distributed to institutions.

138. It has been suggested that changes in funding following RAEs are not great, and that the financial and administrative cost of the RAE process is therefore disproportionate to the change it produces. While it is true, at a gross level, that relative changes in funding are fairly modest, in many instances institutional changes are around 10 per cent – sufficient for the HEFCE to moderate the changes over time. It is also clear that changes within an institution offset each other, and at the subject level changes are much more substantial, with something like 20 per cent of funds moving between departments following the 1996 RAE. In addition, some 5 per cent of funds were withdrawn from units rated 1 and 2, adding to the overall level of movement. As shown in Table J1, if one includes changes related to the RAE but not derived directly from it, the level of movement is much higher.

Equal opportunities

139. In paragraphs 201-205 below, we discuss the serious concern that the RAE may provide disincentives to institutions to recruit staff without an established research record, thereby, in particular, disadvantaging young academics, women who have taken a career break, and those who are seeking to embark upon an academic career having previously pursued a different career path. As far as young people are concerned, evidence provided by an analysis of staff returned to the last RAE (shown in Figure J1) suggests that whatever the apparent disincentives, the recruitment behaviour of institutions has not discriminated against such staff.

140. The sub-group considering the development of research people is currently steering a study to collect new evidence which will inform an ongoing review of the causes of gender and ethnic imbalances within the sector, and the specific contribution to equity which could be made by changes in research policy and/or its implementation.

[18] HEFCE 00/36, 'Better accountability for higher education: a review for the HEFCE by PA Consulting'.

Interdisciplinary research

141. Figure H1 provides clear evidence that a considerable amount of the research undertaken in academic institutions is interdisciplinary or multidisciplinary. Despite this, it is sometimes suggested that the RAE inhibits interdisciplinary research because a subject-based assessment process must be biased against it. We have found no evidence that interdisciplinary and multidisciplinary research are inappropriately assessed by the RAE. This was also a central conclusion of an analysis in 1998.[19] Figure H2, extracted from that report, shows no relationship between the extent to which individuals engaged in interdisciplinary or multidisciplinary work and the RAE rating of the submission of which they were a part.

142. However, this does not mean that the HEFCE can be complacent; we welcome the recognition of potential problem areas and changes for the 2001 RAE detailed in Tables H4 and H5. In particular, the establishment of umbrella panels, and the requirement that assessors should respond to requests that a submission to one panel is also considered by other panels, should reassure researchers that interdisciplinary and multidisciplinary research will be properly addressed.

Staff movement

143. Concern has been expressed that the RAE has encouraged an academic transfer market, with institutions trying to increase their chances of high ratings in the short term by recruiting staff with an outstanding research record shortly before an RAE.

144. We are aware of the difficulties sometimes caused when key members of staff move on, but we do not believe that the movement in the UK is a major problem. Indeed, the evidence, summarised in Table J6, indicates that the extent of movement overall is rather low, among all grades of staff in all types of institution, and possibly so low as to be inconsistent with maintaining dynamism in the sector. It is also lower than that which occurs, for example, in the US or in some industrial research laboratories.[20]

145. The timing of appointments may be influenced by the RAE, but the evidence indicates that the exercise alone has relatively little influence on the decision to appoint. Nevertheless, we believe that the change to the RAE in 2001, whereby staff who move in the year prior to the RAE may be cited by both the exporting and importing institutions, is a helpful measure and should be repeated in any subsequent exercise.

Applicable research

146. Up to now the quality of research, along with volume, have been the sole drivers influencing the allocation of research funds. The rules for the RAE are written in terms only of the quality of work: it is not intended to take account of any other factors. We believe that this remains the right approach. We do recommend an increased recognition of the different characteristics of excellence in different disciplines (paragraphs 148-151). But we do not accept, for example, that research should be rated more highly by the panels because it is deemed to be 'useful', or marked down because it is deemed not to have potential for application. Not least because it is difficult to assess the potential utility of much research, though it subsequently has a decisive impact. However, neither do we consider that there is any dichotomy between applicability and quality, and we recognise that collaboration with users and impact outside the discipline may be indicators of research quality. It is important that high quality research in all its manifestations should be recognised as such by the panels in their criteria and assessment processes. We consider that this is the most powerful way in which applicable research can be further encouraged, as it should be in order to ensure that HE can continue to make its essential contribution to economic and social development.

147. It is vital that people considering lines of research to pursue should be in no doubt that the quality of their work will be fairly assessed, whatever its nature. In both the 1996 and 2001 RAEs, assessment panels have been instructed to attach equal weight to all research, whatever its type or purpose. Furthermore, in the 2001 exercise,

[19] RAE 1/99, 'Interdisciplinary Research and the Research Assessment Exercise'.

[20] Quality assurance sub-group report paragraphs 45-46.

73 per cent of panels include users of research, who will assist in judgements about applicable research.[21] We welcome these developments. However, in constructing future assessment exercises, there needs to be recognition that users and other non-academics may find it difficult to devote as much time and effort to the RAE process as the present arrangements require. The HEFCE should consider how the RAE can further evolve to ensure that users are able to engage fully with the assessment process.

Recommendation: The quality of research should continue to be the sole basis for assessment in the RAE, but the HEFCE should continue to consider means to ensure that applicable research is fairly assessed.

Characteristics of excellence

148. Up to now the RAE has been conducted on a more or less common basis across units of assessment. In general, the information provided within RAE submissions has been the same, and subject panels have had to exercise their judgements in a similar fashion. Subject panels are free to adopt their own criteria for determining excellence, based on the characteristics of their subject. This has produced some significant variations between subjects in the criteria, but within a fairly constrained framework.

149. By and large, we believe that this has been the right approach and has led to some considerable confidence in the consistency and legitimacy of ratings. But we also feel that there should be more scope for explicitly acknowledging the different characteristics of excellence across subjects in the RAE (see Table G1).

150. Submissions must be allowed to describe research in terms that recognise the different characteristics of excellence, and subject panels must take these characteristics into account in making their judgements. This may mean different information being provided for different subjects, or more likely clusters of subjects. We recognise that this increase in sophistication may increase the complexity of the RAE, but we believe that it will make the exercise more robust and respected by the academic community and external audiences.

151. We do not attempt here to define the different characteristics of excellence of different subjects; that is a matter for the peer review panels in the different subjects. But it might mean that in physics or chemistry, for example, impact factors and citation information might play a part (see Figure 11); whereas in history more attention might be paid to longer-term scholarly activities such as the editorship of dictionaries or bibliographies.

Recommendation: The RAE process should recognise that different disciplines have different characteristics of excellence, and panels should be able to make their judgements drawing on evidence provided specifically for their discipline. The criteria adopted should continue to be transparent.

New units of assessment

152. The RAE is a discipline-based exercise, and is sometimes criticised for being insufficiently responsive to the changing taxonomy of the research landscape (common themes emerging from an analysis of the changing research landscape are shown at Table H6). In particular, there is pressure from emerging areas, which often arise by combining one or more existing disciplines, to create new units of assessment. Two recent examples are development studies and gender studies.

153. There is a balance to be struck between providing separate units of assessment for the almost limitless combinations of subjects which may come together for the purpose of conducting research, and the need to have a manageable number of units to which institutions may choose to submit. We consider that if an area reaches a certain level of stability and maturity, and there can be confidence that this is so, then effectively a new discipline has been created, and a new unit of assessment may be appropriate.

[21] RAE 2/99, 'Guidance on Submissions', p2. See also 'Report of the work of the Joint Funding Bodies/CBI Task Group on User/Industrial Participation in the RAE 2001', available at www.rae.ac.uk, under 'Publications'.

154. Even in these circumstances, the provision of a separate unit of assessment may not follow automatically. There are some well established disciplines which are subsumed in larger groupings because they are too small for a separate unit of assessment to be appropriate. Nevertheless, we believe that where a new area is judged to have emerged, and is stable, consideration should be given to whether a new unit of assessment is appropriate. As in the past, this must remain essentially an academic judgement.

Recommendation: Where combinations of disciplines are judged to have given rise to a new area, and it has achieved maturity, then consideration should be given to creating a new unit of assessment.

HEFCE 00/37 23

Impacts on other activities

Relationship between research, teaching, scholarship and other activities

155. One criticism sometimes voiced about the present funding arrangements is that they encourage academic staff to devote too much attention to research at the expense of other activities, such as teaching and the transfer of knowledge outside academic institutions.

156. Although the blame for this is levelled at the RAE in particular, it is at least in part a consequence of funding research selectively in the absence of equivalent incentives to undertake other activities. If the rewards for outstanding research are great (and the penalties for reductions in RAE ratings severe), and there are no equivalent rewards and penalties for teaching or for other forms of activity, then it is not surprising that there is so much focus on research.

157. We do not believe that the answer to maintaining motivation and improving the delivery of other activities is to tinker with the process of research funding or assessment: that would be to act on the wrong instrument. Rather, the solution is to create other and parallel reward systems so that academic staff and their host institutions see incentives to put their effort into other activities, where they are likely to add more value than in undertaking research.

158. Notwithstanding our view that parallel reward systems are needed, it would be offensive to academics, and wrong, to believe that they have no motivations to deliver high quality teaching other than funding incentives. There is ample evidence that the quality of teaching in universities and colleges in this country is high, and that concern with teaching has increased, in part because of recent efforts by the Council.[22]

More support for knowledge transfer

159. A key function of HEIs is to conduct research which can be taken up by industry (to develop products and services), and by other users in the community and those delivering public services. This has always been so, but the emphasis on this aspect of research activity has grown in recent years. We have heard concerns that institutions are not in all cases as responsive as they should be to the needs of industry and other users.

160. The higher education environment has been transformed in recent years, and institutions, and individual academics, are far readier than previously to collaborate with users of research. This trend needs to continue, and grow, and a number of our later recommendations – for example creating a new capability-development funding stream – are intended to support this objective.

161. The HEFCE already has in place a number of programmes which aim to encourage such activity. In particular, the generic research (GR) funding stream is provided to HEIs in recognition of their success in securing collaborative contracts from industry; and the Higher Education Reach-out to Business and the Community (HEROBC) Fund encourages knowledge transfer and seeks to embed this activity within HEIs as a third core activity, alongside teaching and research. Although such schemes are intended to stimulate responses from institutions, the most potent stimulus for research which is taken up by industry is the income which flows from such contracts.

162. We think that HEROBC, which encourages capacity building to enable institutions to engage in knowledge transfer, is a valuable use of HEFCE funds. It is also important that the RAE, which has a considerable influence over the behaviour of academics, should not inhibit such activity. We made recommendations about this in paragraphs 146-147 above.

163. GR has not been as successful as had been hoped. Apart from anything else, the sum involved (£20 million a year) is too small to influence behaviour – a conclusion reached by a study conducted for the HEFCE.[23] We therefore

[22] JM Consulting et al, 'Interactions', p13.

[23] Forthcoming, 'Review of Generic Research', KPMG/HEFCE.

recommend that the scheme be wound up, and the funds used to contribute to the capability-development stream of funding.

Recommendation: The HEFCE should discontinue GR and should build on HEROBC to encourage higher education institutions to engage with industry.

164. As stated above, at present, there is little reason to divert effort from research into other activities, if the rewards for other activities flow regardless of the effort that is put in, or do not exist at all. If activities other than research are to have parity of esteem and engage the attention of academics to an equivalent extent, better financial incentives will be needed. The Council recognises this, which was one of the reasons for introducing the HEROBC fund.

165. The Council has said that this should develop into a permanent third stream of funding for knowledge transfer, alongside funding for teaching and research. We consider that this is an important development, and note the growing consensus that the HEROBC fund will need to increase substantially from the current level of £20 million per annum if it is to be a credible alternative source of funds and thereby affect individual and institutional behaviour significantly. We therefore welcome the additional £80 million of funding announced in the Spending Review to support HEI-industry links over the financial years 2001-02 to 2003-04. However, if this third mission is to become embedded in HEIs as a core activity this must become a recurrent funding stream of sufficient size to support and promote institutional knowledge transfer activities in the longer term.

166. In addition, if academics and institutional managers are to make serious choices between the different activities open to them, then funding will need to be focused on institutions to a greater extent. The HEFCE and the Department of Trade and Industry (DTI) will need to consider the basis of funding and the information needed to achieve this.

Recommendation: The funds provided by the HEFCE and the DTI for HEROBC should be increased substantially on a sustainable basis, and mechanisms established for the selective distribution of these funds.

167. The increase in HEROBC funding will complement the measures proposed in this report to increase the effectiveness of the research base in undertaking collaborative activities with industry, and with the wider community of research users. These measures, which include better approaches to the assessment of applicable research and greater recognition of the different dimensions of excellence, build on the changes introduced in the 2001 RAE.

Teaching and research

168. We commissioned research to establish whether, and to what extent, funding policies for research, and in particular selective funding, might impinge upon teaching. Most academics argue that good research is necessary for good teaching.[24]

169. However, there is a difference between academics being engaged in creating new knowledge themselves, and being alert to developments in their subject, including new discoveries, so that they can interpret and reinterpret the knowledge base of their subject to inform their teaching.

170. This latter activity has been called scholarship,[25] and we consider that this is a useful and necessary concept, distinguished from research, and essential for all academics. This is particularly the case in the UK higher education system, where academics have to teach disciplinary areas well beyond their specialism. Teaching needs scholarship and scholarship depends on, and is distinct from, research. What is required is for all teaching to be animated by scholarship and for scholarship in turn to be informed by research.

[24] JM Consulting et al, 'Interactions', p19.

[25] We emphasise that we are not talking here about 'scholarship' in the sense that it is sometimes used, particularly in the humanities and social sciences, to indicate original work which extends knowledge and understanding in the subject. Here, we are using it in the narrower sense of keeping abreast of one's subject, which may imply some degree of reinterpretation of existing knowledge, but which is essentially a different and more limited activity.

Recommendation: Scholarship is an activity which is distinct from research and should be required of all academics who teach.

171. The evidence we have received suggests a strong relationship between good research and good teaching.[26] This relationship is not simple or uniform: it is not true to say that there is no good teaching without good research, nor that good research is always accompanied by good teaching. But in general, over the sector as a whole, such a synergistic relationship does exist.

172. However, during the review, no evidence emerged as to the precise mechanism underpinning the relationship. One suggestion is that because of selective funding, good research leads to higher rates of funding for institutions, and this funding is used by institutions to develop laboratories, equipment and libraries, and to recruit academic staff. All of this is intended for research, but it may provide greater flexibility and the opportunity to share staff and resources between teaching and research in a way which is not available to institutions with less research funding. However, it is clear from the fact that good teaching may take place without good research, and vice-versa, that this simple proposition does not provide a satisfactory answer.

173. It is also clear that the ability to do research is for many academics a strong motivating factor in their decision to join the profession in the first place. A number of institutions responding to our call for evidence said that access to small amounts of research funding had enabled them to transform the culture of their organisations, by legitimising and recognising the research work and aspirations of staff. This affects the functioning of individuals as academics.

174. The review was able to reflect on some preliminary results arising from the Transparency Review (a review of the costs of research and other activities in HEIs). Although these early data are provisional, it seems that institutions are subsidising both publicly-funded teaching and publicly-funded research. This 'subsidy' may come from income provided for the institutions' other activities, the running down of capital, or by additional unpaid hours worked by staff. There has also been a real-terms decline in the pay of academic staff which in effect represents an additional subsidy for research.

175. Despite the evidence of a synergistic relationship between teaching and research, we make no recommendation about this: it would be wrong to allow teaching issues to influence the allocation of funds for research. The Government provides funds to the HEFCE to promote and advance research, and the Council would be rightly criticised if part of this money were allocated not on the basis of research interests, but because it might improve the quality of teaching. But given the imperative for all staff to engage in scholarship in order to animate their teaching, we believe it should be made clear that funds for teaching include an element to support scholarship.

Recommendation: The HEFCE should make it clear that its funds for teaching include an element intended to enable staff to engage in scholarship.

A new strategic funding stream to support capability development

176. While we consider that it is right that most research funds should continue to be provided through the block grant as QR for institutions to spend at their discretion, we believe that a modest proportion should be provided so that the HEFCE can, through institutions, respond to national, regional and local needs.

177. Under this capability-development stream of funding, the HEFCE would calculate an entitlement for each institution, and would state, for the sector as a whole, the broad areas to which these funds should be devoted. Funds would be released once institutions had provided satisfactory strategic proposals for their use. The areas where these funds might be focused include:

[26] JM Consulting et al, 'Interactions', Annex B, pp17-18.

- new and emerging subjects, where there might otherwise be some time lag in institutions taking them up
- subjects where PhD provision across the country is inadequate
- projects responding to local, regional and national needs.

178. The fund would aim to address a number of weaknesses in the HEFCE's current funding arrangements, discussed below:

a. Given the relatively small amount of money flowing to 3b and 3a rated departments, there is a risk of these funds being spread too thinly. Institutions that receive small amounts of money may not be able to concentrate them sufficiently to build capability in key areas of relative strength.

b. The present arrangements, and in particular the policy of selectivity and the RAE which underpin them, provide substantial incentives to institutions and individual academics to conduct basic research, and research at the leading edge, perhaps at the cost of research which is locally, regionally or nationally relevant. One complaint heard is that users of research (not only industry, but users of academic expertise more generally) sometimes find it hard to interest academics in taking up commissions which divert them from such leading-edge research.

c. With assessment and allocation methods based on existing disciplines, it is often difficult for new and emerging subjects to secure funding. Although the HEFCE allocates a block grant to HEIs, and the basis on which money is allocated need not determine the way it is spent, there remains a strong suspicion that the system inhibits the development of new areas of research. The problem is not new, but it is accelerating with the increasing pace of developments in knowledge.[27]

d. Given the drive for international excellence in research, the needs of local, regional or national users of research may not be sufficiently taken into account.

179. This last point is a subtle issue. Research is by its nature an international activity: research findings are disseminated and exploited internationally; research conducted in one country takes account of research findings produced in another. Judgements about the excellence of research transcend national boundaries, and much research is carried out in collaboration across geographical frontiers.

180. Nevertheless, not all research needs to be at the forefront of international thinking in order to be valuable. Smaller scale or more modest research activity is essential, particularly to meet the needs of industry and other users, and to enable international research to be accessed locally and regionally.[28] Firms often look locally or regionally for help in resolving their problems and it is essential that universities and colleges are ready and able to work with them. It is important that the HEFCE ensures that mechanisms are in place to encourage and enable research at all levels. Different drivers and incentives may be needed to achieve this.

Recommendation: The HEFCE should ensure that its funding mechanisms encourage research not only at international levels of excellence, but also at local, regional and national levels.

181. This analysis suggests that institutions could benefit from three distinct research funding streams:

- researcher-driven funding, which would continue to be allocated on the basis of quality guided by departmental RAE ratings
- user-driven funding, consisting mostly of funding provided by research users, but including HEFCE programmes to support knowledge transfer
- capability-development funding, where the Council focuses research funding in directions which are of strategic importance to an institution or its region, or to the nation as a whole.

[27] Policy Research in Engineering, Science and Technology, University of Manchester (PREST), 2000, 'The Impact of the Research Assessment Exercise and the Future of Quality Assurance in the Light of Changes to the Research Landscape', PREST/HEFCE.

[28] Segal Quince Wicksteed Ltd (SQW), 2000, 'Regionality', SQW/HEFCE, chapter 5.

182. Of these three streams, the first two exist in the form of QR and HEROBC respectively, but the introduction of a capability-development stream would be an innovation. The purpose of this fund would not be to support specific areas of research over the long term, but rather to provide institutions or units with a better basis on which to develop more effective strategies for evolving their research activity.

183. In particular, this funding stream would help HEIs work with users to undertake applicable research. Such a funding stream would have a different purpose from HEROBC, which catalyses a broad range of interactions with industry and the community, but does not generally fund research activity directly.

184. Initially, modest sums would be available, drawn from the funds provided for the current generic (GR) and collaborative (CollR) research streams – so it would not be financed by top-slicing QR (in 1998-99 the combined value of CollR and GR was £36 million). But additional funds should be sought to enable this to become an important funding driver. It could become a significant lever in drawing in funds from users – for example, government departments with an interest in research to assist policy development – to establish a proper basis of support for these new areas.

185. The precise mechanism for distributing this stream of funding would need to be worked out, but we envisage something along the following lines. The HEFCE would identify priority areas for investment: new and emerging subjects, for example. These might be based on priorities identified by other national or regional funding bodies; the Government's Foresight programme, where industry has also made a substantial contribution to defining the objectives; or research users such as the Department of Health and the Home Office.

186. The HEFCE would calculate by formula the amount available to each institution, and the funds would be released to institutions in response to specific proposals for their use, taking account of the priorities established by the Council in consultation with others. This would require institutions to develop explicit policies and management strategies for the development of research, and they might be expected to focus their effort in particular areas of strength. Proposals might be encouraged to develop research of particular relevance to an institution's local or regional industry or community. Such funds would be a particularly important source of research funds for institutions which do not generally receive large amounts of QR funding, but which have certain research strengths.

Recommendation: The HEFCE should create a new stream of funding to supplement the existing researcher-driven and user-driven funds. This 'capability-development' funding should be provided to institutions in response to proposals for their use.

Supporting research infrastructure

187. In recent years, there has been increasing concern about the deteriorating state of the research infrastructure in HEIs. The HEFCE commissioned a survey, published in 1996, which confirmed that there were serious grounds for concern.[29] The study has recently been repeated[30] and revealed continuing problems.

188. The Joint Research Equipment Initiative, funded by the HEFCE jointly with the OST, and the HEFCE laboratory refurbishment scheme, were responses to this concern about the imbalance between project and infrastructure funding illustrated in Table K1. An even more substantial response was the £750 million Joint Infrastructure Fund, jointly funded by the OST, the Wellcome Trust and the HEFCE, which has injected a significant and badly needed amount of research capital into the system.

[29] Geoghiou L, Halfpenny P, Nedeva M, Evans J, Hinder S, 1996, 'Survey of Research Equipment in United Kingdom Universities', PREST/Centre for Applied Social Research (CASR).

[30] Hanagan K, Geoghiou L, Evans J, Croasdale P, 2000, 'Research Equipment Needs in UK Universities, a "Snapshot" Study', PREST/CASR.

189. It is essential that the run-down in research infrastructure should not be allowed to persist. We have identified two main drivers, both of which are within the power of the Council or institutions themselves to address.

190. In calculating the funding provided to institutions, the HEFCE relates its grant to quality and to a measure of volume of research in a department. The number of research staff and research students are dominant influences on this, but investment in infrastructure plays no part. Essentially, the more research active staff or students that are recruited, the more grant an institution receives. This provides an incentive to increase the volume of research without an equivalent investment in the infrastructure.

Recommendation: The HEFCE should consider ways of modifying its funding method to remove incentives to recruit research staff and students at the expense of appropriate investment in research infrastructure.

191. A further recommendation relates to the treatment of income which HEIs receive from charities. At present, uniquely among external sources of income, income from charities is taken into account in the volume measure, both for establishing the budgets for subject areas, and for determining the volume of research in each department. This is a recognition of the distinct nature of funding from charities, and enables the Council to make a contribution towards the costs incurred by institutions when carrying out research sponsored by charities. Around £75 million is allocated to institutions each year according to the weighting factor for charity income in the HEFCE research funding method (see Tables K2 and K3).

192. We believe that it is right that the Council's grant should recognise that not all the costs of research sponsored by charities are covered by the project grants institutions win from them, as charities make a substantial and valuable contribution to the national research effort. However, the extent of this additional support should clearly be related to the contribution that charities do make to the projects' direct costs. A solid foundation for an agreed approach, that does not provide incentives to inflate volume, will be provided by information emerging from the Transparency Review, and a study being commissioned by the HEFCE, mapping relationships between institutions and charities.

193. Concerns also persist about the extent to which funding from the European Union (EU) meets the costs of the research projects it sponsors. Although it is possible to obtain grants of up to 50 per cent of allowable costs for research and technological development projects under the EU's Framework Policy 5, no UK university is currently in a position to meet the stringent costing requirements to identify full costs on the basis defined by the EU. Research activity sponsored in UK HEIs is therefore funded by the EU on a marginal basis. One of the outcomes of the Transparency Review should be to enable institutions to meet UK government and EU costing requirements in order to secure full cost recovery.

194. Some institutions should have the basic data required to meet these requirements by the summer of 2001. However, it is unclear when after that time institutions could be confident of receiving EU funding on the 'full cost' basis. This provides 50 per cent of allowable costs, so even then much of the activity that the EU sponsors will remain 'unfunded'. We therefore propose that the HEFCE should consider whether it is necessary to amend the funding model to explicitly recognise that funding provided as EU grants and contracts does not cover all the costs associated with the project.

Recommendation: The HEFCE should no longer include an element which recognises income from charities in calculating the total funding for each subject, but should instead agree an explicit basis of support that reflects the contribution by charities to the direct costs associated with projects.

Recommendation: The HEFCE should consider whether it is necessary to amend the funding model to explicitly recognise that funding provided as EU grants and contracts does not cover all the costs associated with the project.

195. The second driver contributing to the deterioration of research infrastructure arises from the frequent failure of institutions to secure the full costs of contract research for industry, Government and other third party funders. The Transparency Review will shed light on the true costs of carrying out such contract research, and it is essential that institutions reflect these true costs in the amounts they charge for their services. It is, of course, legitimate for less than the full cost to be charged where a piece of work done under contract has strategic importance for an institution. But in general it should be the case, and it is in an institution's long-term interest, that the cost of such work is charged to the beneficiary. In particular, institutions should avoid competing with each other to such an extent that they offer unwarranted discounts.

Recommendation: In general, institutions should charge prices which cover at least the full cost of research which they carry out under contract.

196. We consider that, as a general principle, the HEFCE's funds are best provided as a block grant, as this enables institutions to optimise support for the many activities they are engaged in. However, the research infrastructure must not be permitted to deteriorate again to such an extent. For this reason, we recommend that funds for research capital should be earmarked and provided separately by the Government to the HEFCE, over and above funds provided for the conduct of research.

197. The £1 billion of additional infrastructure funding announced in the Spending Review is extremely welcome and will build on the contribution of JIF in providing a dedicated source of funding (though this time allocated by formula) for investment in research facilities. However, we consider that a recurring stream of research capital funding needs to become a permanent feature of the funding landscape if the research base is to maintain its competitive advantage and not to deteriorate in the future.

Recommendation: Additional funds should be provided annually by the Government for research infrastructure, and these should be earmarked for this purpose when allocated by the HEFCE to institutions.

198. The Council should also consider, regardless of additional funding from the Government, earmarking a proportion of QR funding specifically for infrastructure investment. This could include appropriate support staff who are skilled in the development and use of specialised equipment or experimental techniques, and therefore vital in advancing research programmes.

Recommendation: The HEFCE should consider earmarking specifically for infrastructure investment a proportion of QR funding provided to institutions.

People issues

199. We paid particular attention to questions concerning the needs of researchers and research students. We endorse the conclusion of the 1996 Harris report[31] that research students are entitled to work in a high quality research environment, supervised by experienced researchers, and with close attention paid to their career needs.

200. There is now an even more pressing need that research training and opportunities for career development of those recently embarked on a research career are of the highest standard. Given the importance of this for the sustainability of the research base, and a continued flow of highly trained individuals to meet the demands of industry and society more generally, we propose that the HE funding bodies with the Research Councils and other stakeholders such as industry and charities, should move rapidly to develop minimum criteria for research training. These minimum criteria would apply equally to all institutions, and be a condition for the receipt of HEFCE funding for training of research students. The extent to which institutions met these minimum criteria would be judged in future RAEs after 2001.

Equal opportunities

201. Concern has been expressed in the past that the RAE may provide disincentives to institutions to recruit staff without an established research record, in particular disadvantaging young academics, women who have taken a career break, and those seeking to embark upon an academic career after having previously pursued a different career.

202. As far as young people are concerned, Figure J1, which provides an analysis of staff returned to the last RAE, demonstrates that – whatever the apparent disincentives – the recruitment behaviour of institutions has not discriminated against such staff. The proportion of young staff in the academic system as a whole, and those in the top-rated departments in particular, appears to have increased in the 20 years since the last survey in 1982, well before the introduction of the RAE. Indeed, Table J4 shows that the recent behaviour of research-intensive departments is to recruit a slightly higher proportion of young staff. Nevertheless, this concern has raised the issue of whether the present arrangements provide a sufficient basis for peer review panels to assess the contribution made by staff who for good reasons have not produced demonstrable research outputs.

203. The same concern arises over the treatment of women in the RAE, particularly those who have taken a career break. We believe that the workings of the RAE are even-handed between men and women. Also, women account for 20 per cent of RAE panel members in the 2001 exercise, even though they represent only 10 per cent of senior academic staff. But we are struck by the analysis we commissioned, illustrated in Figure J2, which demonstrated that women are not proportionately represented in the highest scoring departments. The reasons behind this may be complex, and may not necessarily be related to the RAE. For example, the barriers which women encounter may be at the point of entry into postgraduate study, or may relate to choices of discipline or to internal staff development policies.

204. Whatever the reasons, this is a serious issue, both from the point of view of the individuals concerned and the health of the research base. If there is any suggestion that significant numbers of individuals are failing to realise their full potential, including women and those from ethnic minorities, for whatever reason, this needs to be rapidly explored and addressed.

205. This area will be addressed by the sub-group examining issues related to human resources as part of a wider commitment to improve equal opportunities in the academic sector. This sub-group will continue to meet for a further 12 months to advise on the early implementation of measures to enhance research training and equal opportunities, to oversee further evidence gathering on equal opportunities, and to ensure that an integrated approach to these issues is adopted with the Equal

[31] Harris M, 1996, 'Review of Postgraduate Education', HEFCE/CVCP/SCOP.

Opportunities Action Group recently established jointly by the HE funding bodies and the sector's representative bodies (CVCP and SCOP).

Recommendation: The HEFCE should consider, initially through the human resources sub-group, the relative under-representation of women in the highest-rated departments and whether there are other groups who appear not to be realising their full research potential.

206. In the 1996 RAE, institutions were able to describe why some members of staff might not have produced submissible research outputs that were indicative of the quality of their work. We believe that this should be formalised further. We propose institutions should be able to provide personal statements on behalf of staff for whom, for whatever reason, a normal contribution to the standard form of submission is not appropriate. Typically, but not exclusively, this will include those who are at the beginning of their academic careers or who have taken a career break.

207. The practicalities of this proposal need to be considered further. Even if the personal statements are limited to two or three pages, this may lead to significant additional reading for panel members. On the other hand, it will allow a fuller and more comprehensive account of the achievements and potential of the staff concerned, and undoubtedly improve the exercise.

Recommendation: Submissions to the RAE should be allowed to include personal statements in respect of staff for whom, for whatever reason, a normal contribution to the standard form of submission is not appropriate.

Research training and career development

208. One of the principal outputs of the research base is a supply of trained researchers. These individuals may go on to pursue academic careers, but increasingly their skills and knowledge are valued by society more widely, and by industry in particular. However, the supply and development of such individuals, including postgraduate and post-doctoral researchers, is not directly addressed by the current RAE process, and there is evidence that current postgraduate training and career development is in many ways failing to meet the needs of research students.[32]

209. In the 2001 RAE, panels have been encouraged to place more emphasis on assessing research culture, including factors related to postgraduate training.[33] But we believe that research training is a key indicator of sustainability and therefore it warrants more explicit recognition in the assessment process. We recommend that research training be the subject of a separate, but linked, assessment process to the RAE. We also recommend that funding provided by the HEFCE in respect of research training should be calculated and identified separately from the funding provided for research.

Recommendation: Research training should be the subject of a separate, but linked, assessment process to the RAE.

Recommendation: Funding provided by the HEFCE for the training of research students should be calculated and identified separately from the funding provided for research.

210. We believe that further more profound moves may be needed to ensure the best possible environment and experiences for postgraduate research students. We have considered whether postgraduate research support should be allocated more selectively. Our consultation indicated little support for the deliberate concentration of research funding, but there was support for concentration of research training: almost half of the 90 responses on this issue suggested that research trainees would benefit from some form of concentration.

211. The 1996 Harris report argued that research students are entitled to be supervised by academic staff who are talented researchers, and to work in an environment of the highest research standards. More particularly, the range of skills to which a postgraduate research student needs access are unlikely to be provided by a single academic

[32] JM Consulting *et al*, 'Interactions', Annex E.

[33] RAE 5/99, 'Assessment Panels' Criteria and Working Methods'.

supervisor. A student is more likely to succeed in a research-intensive department with a well developed research infrastructure, and an appropriate breadth and depth of supervisory expertise. For these reasons, the HEFCE now only funds research students in departments rated 3b and above.

212. But does this go far enough? If the research assessment process were to assess research training explicitly, funding for research training could be concentrated in those departments able to demonstrate excellence in the field.

213. We are conscious that postgraduate research training is a key element in the development of the research effort of institutions, and a move towards greater concentration might undermine the ability of lower-rated departments to improve the quality of their research. There is a dilemma here between the need to protect the interests of research students, and the need to recognise the legitimate aspirations of institutions and their staff to develop their research profile.

214. We are aware that some will be concerned by the suggestion that research training should be concentrated and there are good reasons why we should temper excessive concentration of provision for research students, for example:

- the US experience suggests that over-concentration of research training can be as problematic as over-dispersion[34]
- in larger departments, for example, there may be some outstanding researchers able to provide supervision of the highest standards, although the department overall may be low-scoring in the RAE
- in many subjects, particularly in the humanities, the quality of support depends very largely on the individual supervising the student's work.

215. We conclude, therefore, that it would be wrong to further restrict funding for research students simply according to RAE scores. Nevertheless, it is important to protect the interests of postgraduate students by ensuring that they have access to supervision of an appropriate standard, and a research environment that will provide a high quality research training experience.

Postgraduate research training criteria

216. Instead we propose that a department wishing to receive funding for postgraduate research training should meet a number of specified criteria. These would cover, for example, the facilities and the quality of the environment in which the student works. As part of the assessment process, RAE panels would judge whether a department met the criteria. Only then would funding be released.

217. The criteria should be rigorous, and we think it likely that many departments currently receiving postgraduate funding would not be able to satisfy all the requirements alone – for example the requirement to provide exposure to a research environment of international quality. We therefore propose that collaborative arrangements should be established (see Tables F4, F5). These might be physical or virtual, and might be organised on a discipline or geographical basis. They would allow lower-scoring departments to train postgraduate research students, but ensure that students received training that at least met an agreed minimum standard.

218. We do not make recommendations here about the details of such arrangements, which need not in any case be uniform (see Table F6), but we urge the Council to accept the principle of minimum training requirements, and to work up the practicalities. This should be a joint activity between the HEFCE, Research Councils and others, both because the funding of postgraduate research students has multiple sources, and because expertise about these matters is widespread across the sector.

Recommendation: The HEFCE, together with the Research Councils and other stakeholders such as industry and charities, should develop minimum requirements which departments would need to satisfy in order to be eligible for HEFCE funding for

[34] Bowen W and Rudenstine N, 1991, 'In pursuit of the PhD', Princeton University Press.

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postgraduate research student training. The research assessment process should be extended to establish whether departments comply with these minimum standards.

Recommendation: Collaborative arrangements should be established to enable units to meet all aspects of the postgraduate research training requirements, where they might not be able to do so alone. The HEFCE should separately work up the practical arrangements to implement this recommendation.

219. Although the assessment of research training in this explicit way would not occur until a subsequent exercise after 2001, we consider that the issue is so important that measures should be put in place at an early stage.

Numbers of PhD students

220. Another issue concerning postgraduate research training is the number of PhDs being produced. We consider that an advanced modern society needs an appropriate number of students with higher degrees. Such graduates are needed to underpin teaching in universities and colleges, particularly for third year work at bachelors level and for postgraduate programmes, and it is from PhD students that the next generation of academic staff are drawn. They are also, of course, needed to carry out and develop research in HEIs, industry and the wider economy.

221. In 1997-98, the UK produced 258,800 first degree graduates and 11,000 doctorates. There were 54,000 other higher degrees awarded. On average, 4.2 PhDs were awarded for every 100 students graduating with a first degree.[35] Overall, this is well in excess of the 1 per cent of students going on to study for a PhD that we estimate is needed for replenishment of the academic profession, although relatively poor academic salaries and conditions of service provide cause for concern about whether this level of uptake will continue. However, for some disciplines which compete head on with outside professions there is a serious shortfall of individuals going on to undertake research training. We have identified a significant number of subjects, some with significant student demand at first degree level, with hardly any PhD output at all. For all these reasons we propose that the HEFCE should deploy some funds strategically to address shortfalls in PhD numbers and therefore research capacity.

Recommendation: The proposed capability-development stream of funding should be employed to ensure adequate PhD output in all subjects.

Human resource management and career development

222. As we have observed above (paragraph 173), the opportunity to conduct research is a key motivation for many academic staff. This is undoubtedly why, despite relatively poor pay prospects, some of the best graduates continue to be attracted into the academic profession.

223. We welcome the increase in research student stipends announced in the Spending Review. However, if the brightest and best students are to continue to be attracted to acquire research skills, whether or not they subsequently chose pursue an academic career, we must provide sufficient financial support.

224. We welcome the additional £50 million provided in the Spending Review to recruit and retain top-quality academic staff. However, if pay more generally continues to lag behind that in other professions and there continues to be an associated, insidious, decline in the status of academic staff, the sustainability of the research base, and its contribution to the economy and society more generally, will be threatened.

225. For those who choose a research career, the main issue often centres round the question of personal and career development. Too often new staff are given little or no remission from teaching and administrative activities, and little or no support in establishing their research. Often they are obliged to develop new courses and to learn

[35] Nature and purpose sub-group report, paragraph 57.

how to integrate the other duties of academic staff without assistance. When staff are required to supervise research students they often have to do so without any training.[36]

226. A further concern centres on the number of research staff on fixed-term contracts. Statistics for 1997-98 suggest that some 34 per cent of all academic staff are on fixed-term contracts. More specifically, some 17 per cent of research active staff are on fixed term contracts.[37] We note that the Research Careers Initiative (RCI) has developed metrics to assess the quality of training and development of such staff, and that the Research Councils support this initiative.[38] We consider that these principles should be embraced as policy proposals are developed.

227. Many of these career development issues can be addressed through measures that ensure proper attention is paid to human resource management at all levels (for instance, we consider that after their first year PhD students should be treated as members of staff in this regard). We propose that all institutions should adopt staff development strategies so that the issues identified in this review, and human resources questions more generally, are addressed systematically. This aspect of research policy should feature prominently in the assessment and funding process.

Recommendation: Institutions should be required to submit a staff development strategy as a precondition for the release of research funding.

228. We need to be careful though. Increased support for career development, which requires departments to develop explicit staff development strategies, might have unintended consequences. If institutions were obliged to employ people on a longer-term basis it might simply reduce the opportunities provided by temporary academic positions. This might lead to many good researchers leaving the profession. We therefore suggest that the implications of any proposed changes are considered in detail, and we have asked the sub-group looking at human resources issues to consider these matters further.

[36] JM Consulting *et al*, 'Interactions', Annex E.

[37] HEFCE Analytical Services Group, 2000, 'Characteristics of Research Active Staff', available at www.hefce.ac.uk, under 'Research'.

[38] RCI, 2000, 'Research Careers Initiative: Second Report', available at www.cvcp.ac.uk under 'Linked Activities'.

Annex A

Committee for the review: membership and terms of reference

Membership

Sir Brian Fender (Chair)
Chief Executive
Higher Education Funding Council for England

Professor John Andrews
Chief Executive
Higher Education Funding Council for Wales

Mr Bahram Bekhradnia
Director of Policy
HEFCE

Sir Alec Broers
Vice-Chancellor
University of Cambridge

Dr Mike Dexter
Chief Executive
The Wellcome Trust

Professor Roderick Floud
Provost
London Guildhall University

Professor Martin Harris
Vice-Chancellor
University of Manchester

Professor Julia Higgins
Professor of Polymer Science
Imperial College of Science, Technology and Medicine

Mr Peter Holmes
Under-secretary
Department for Higher and Further Education, Training and Employment
Northern Ireland

Professor Peter Lachmann
Chairman
National Academy's Advisory Group

Professor Howard Newby
President
Committee of Vice-Chancellors and Principals

Professor Stephen Newstead
Professor of Psychology
University of Plymouth

Professor Sir John Pattison
Director of Research and Development
Department of Health

Dr David Pilsbury
Head of Research Policy
HEFCE

Sir Gareth Roberts
Vice-Chancellor
University of Sheffield

Mr Nick Sanders
Director for Higher Education
Department for Education and Employment

Professor John Sizer
Chief Executive
Scottish Higher Education Funding Council

Dr John Taylor
Director General, Research Councils
Office of Science and Technology

Dr Keith Taylor
Chairman and Chief Executive
Esso UK Plc

Ms Dorma Urwin
Chair
Standing Conference of Principals

Mr Peter Agar
Deputy Director General
Confederation of British Industry

Professor Alan Wilson
Vice-Chancellor
University of Leeds

A full list of sub-group members is given on the web-site, www.hefce.ac.uk under 'Research'

40

Terms of reference

The terms of reference of the committee are to conduct a fundamental review of HEFCE research policy and funding. This should cover the principles and mechanisms which currently underpin research funding and take into account the views of major stakeholders. In particular, the following thematic issues should be considered:

- the balance between support of established disciplines and centres of excellence and support of emerging subjects and new centres
- whether to continue to exercise selectivity by discipline or by institution.
- the need to maintain the international competitiveness of the research base, while ensuring that institutions are available to contribute fully to their regional economies and communities
- the need to ensure that research policies and funding continue to promote high quality research, without adversely affecting teaching quality or the ability of institutions to engage with business and the community
- the need to ensure that research policies and funding promote high quality research training, especially when this may be separated from the production of high quality research outputs
- the role of quality assurance and evaluation processes in support of the Council's policies and practices.

Advice is also sought on the funding mechanisms that will most effectively promote the recommendations made.

Annex B

Reports generated as part of the review

Sub-group reports

- The role of selectivity and the characteristics of excellence
- The nature and purpose of HEFCE funding
- The role of quality assurance and evaluation
- The interaction between teaching, research and other activities of HEIs

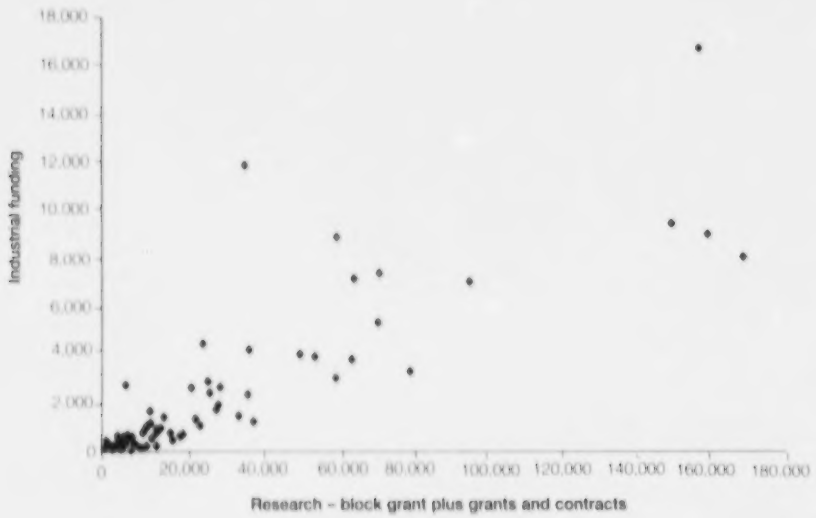
Consultants' reports

- Adams J, Law G, Cook N, Marshall S, Wilkinson D, Mount D, Bayers N, Pendlebury D, Small H, Stephenson J, 2000, 'The Role of Selectivity and the Characteristics of Excellence', Higher Education Policy Unit, University of Leeds (HEPU).
- Geuna A, Hidayat D, Martin B, 1999, 'Resource Allocation and Research Performance: the Assessment of Research', Science and Technology Policy Research, University of Sussex (SPRU).
- Higher Education Consultancy Group, Commonwealth Higher Education Management Service, 2000, 'An Evaluation of the CollR Initiative' (HECG).
- JM Consulting Ltd; CHES, Institute of Education, University of London; Commonwealth Higher Education Management Service; Higher Education Consultancy Group, 2000, 'Interactions between Research, Teaching and Other Academic Activities' (JM Consulting et al).
- Katz J and Smith D, 2000, 'Collaborative Approaches to Research', HEPU/SPRU.
- Millar, J and Senker J, 2000, 'International Approaches to Research Policy and Funding: University Research Policy in Different National Contexts', SPRU.
- Policy Research in Engineering, Science and Technology, University of Manchester (PREST), 2000, 'The Impact of the Research Assessment Exercise and the Future of Quality Assurance in the Light of Changes to the Research Landscape', PREST.
- Segal Quince Wicksteed Ltd (SQW), 2000, 'Regionality', SQW.

Annex C

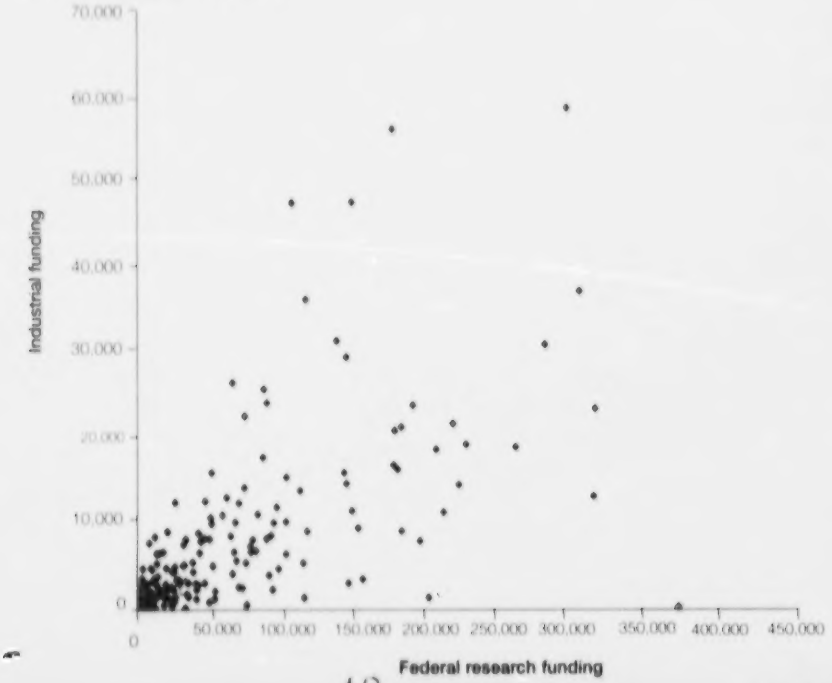
Correlation between public and private sector investment in the HE research base

Figure C1 **Public versus commercial research funding for UK HE institutions (£000s, r=0.86)**



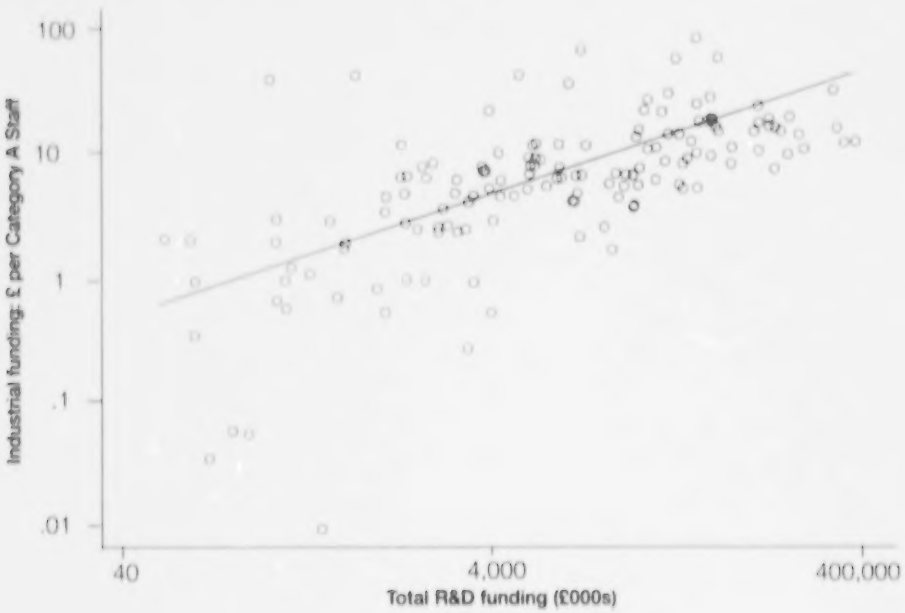
A key concern of the review has been to establish whether there is a conflict between the traditional academic definitions of excellence used as the basis for distributing public funds through Research Councils and funding bodies, and the definitions of excellence relevant to industrial and other users of research. Findings shown above from HEPU indicate a close correlation between public and private sector funding of research in the UK.

Figure C2 **Public versus commercial research funding for US HE institutions ($000s, r=0.6)**



Comparison of Figure C2 with Figure C1 shows that the correlation is better in the UK than in the US. We consider that this is evidence of a generally better alignment between fundamental and applied research in the UK than in the US.

Figure C3 **Commercial funding per category A staff member (RAE 1996 return) versus total research funding**



A further analysis by HEPU confirmed that there was no separation between innovation and application. There is a greater concentration of commercial funding as public funding increases: industrial funding per category A staff member (RAE 1996 return) increases as total research funding increases.

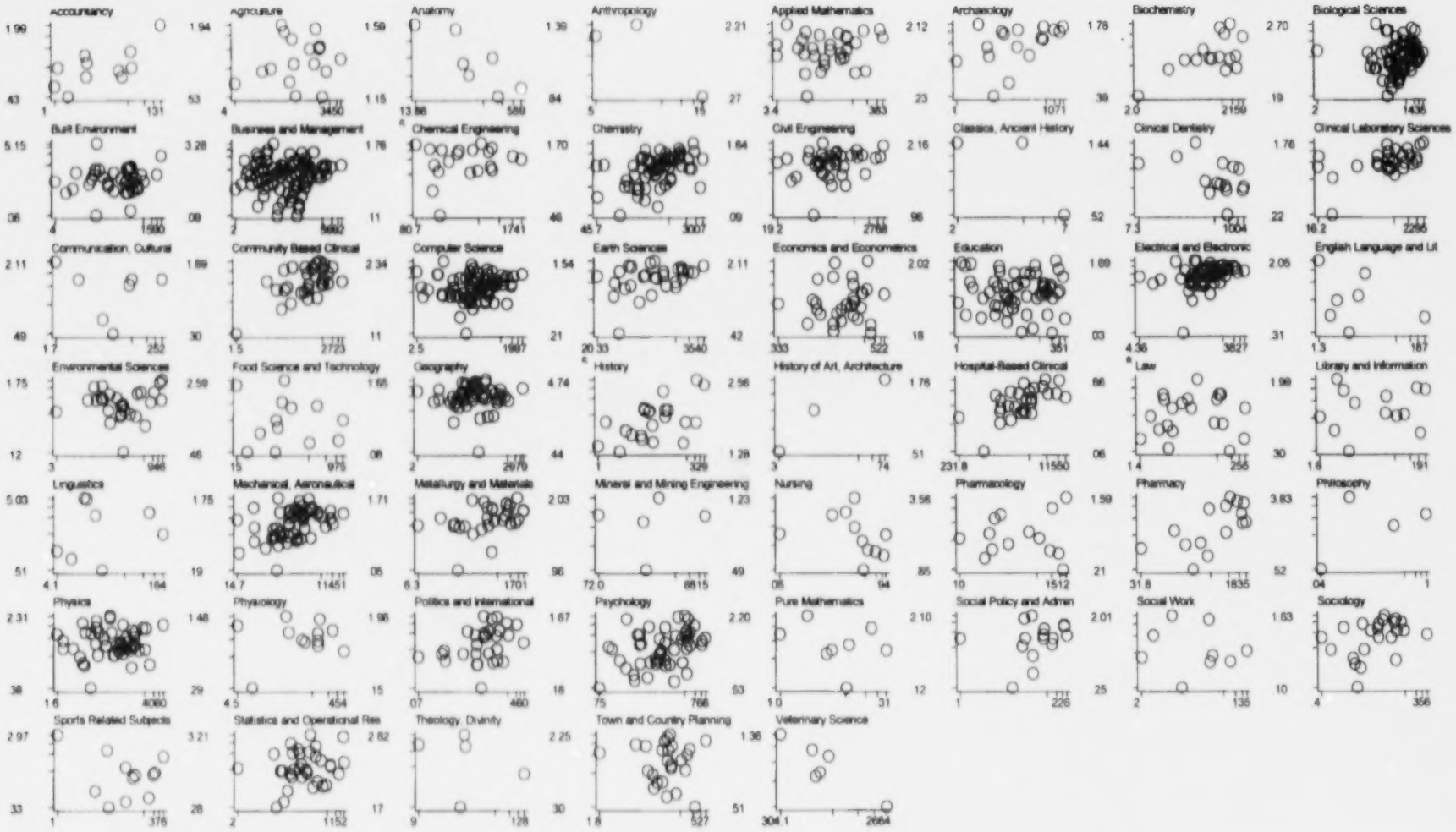


Figure C4 **Relationship between industrial funding (X axis) and bibliometric impact (Y axis) by UoA**

The analysis in Figure C4 was undertaken to explore the relationship between commercial funding and research impact. It measures the extent to which applicable and fundamental research are correlated. The relationship between industrial funding (X axis) and bibliometric impact (Y axis) shows a great deal of variation, but there are a number of areas where commercial funding is clearly correlated with bibliometric impact, arguing that those units winning more recognition from academic peers are also earning more industrial and commercial funding for their research.

Table C1 **In-house corporate R&D as a proportion of GDP (1997)**

UK	1.2%
Germany	1.6%
France	1.4%
Italy	0.6%
Japan	n/a
Canada	1.0%
US	2.0%

UK industry invests a lower proportion of its income on in-house research than industry in a number of other OECD countries, thus reducing its ability to 'pull' from the research base.

Annex D

International comparisons of research spending and performance

Table D1 **Gross expenditure on R&D (at purchasing parity prices – PPP) for 1997 in the UK, Germany, France, Italy and the US**

Research funding	Total (£ bn at PPP)	Proportion of research funding provided by Government	Research funding as a proportion of GDP
UK	14.7	30.8%	1.80%
Germany	29.3	35.0%	2.39%
France	19.2	41.5%	2.26%
Italy	8.2	47.9%	1.05%
US	140.3	31.6%	2.64%

Table D2 **Papers per $ million, citations per $ million, and papers per researcher for selected leading industrialised nations (1997)**

	Papers per $ million[1]	Rank	Citations per $ million[2]	Rank	Papers per researcher[3]	Rank
UK	16.0	1	70.5	1	11.2	4
Canada	14.7	2	61.0	3	10.9	5
Australia	13.9	3	48.3	7	10.2	6
Ireland	12.9	4	38.2	10	7.0	11
Spain	12.1	5	36.3	11	5.2	13
Sweden	11.3	6	52.3	4	15.7	1
Switzerland	10.9	7	65.7	2	15.3	2
Netherlands	10.3	8	48.7	6	11.3	3
France	9.8	9	38.3	9	8.4	9
Belgium	9.5	10	41.3	8	9.9	7
US	9.2	11	49.0	5	9.2	8
Italy	9.0	12	34.0	12	5.6	12
Germany	7.9	13	31.9	13	7.2	15
Portugal	7.2	14	17.9	15	1.8	16
Austria	7.1	15	25.9	14	7.3	10
Japan	3.6	16	11.7	16	4.5	14

Source: Katz, 2000 – taken from OECD, Main Science and Technology Indicators, OECD Statistics, 1999 and ISI National Science Indicators

1. Higher education R&D expenditures in 1997 in $ dollar PPP.

2. Number of citations per paper from ISI National Science Indicators.

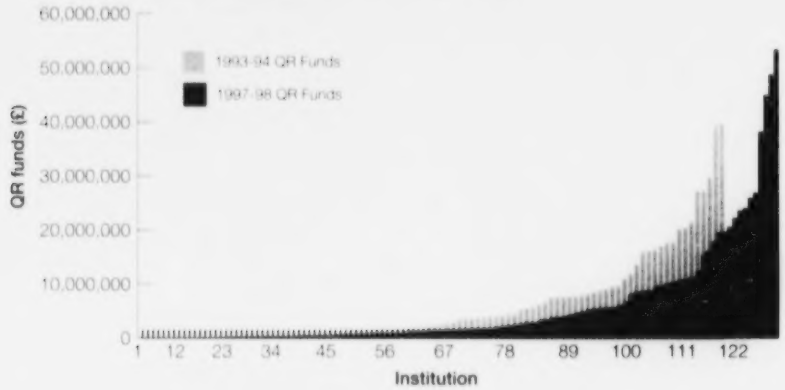
3. OECD sources.

See also Table C1 for comparisons of in-house corporate R&D by business in selected OECD countries and Table G5 for a comparison of selectivity in the UK compared with the US.

Annex E

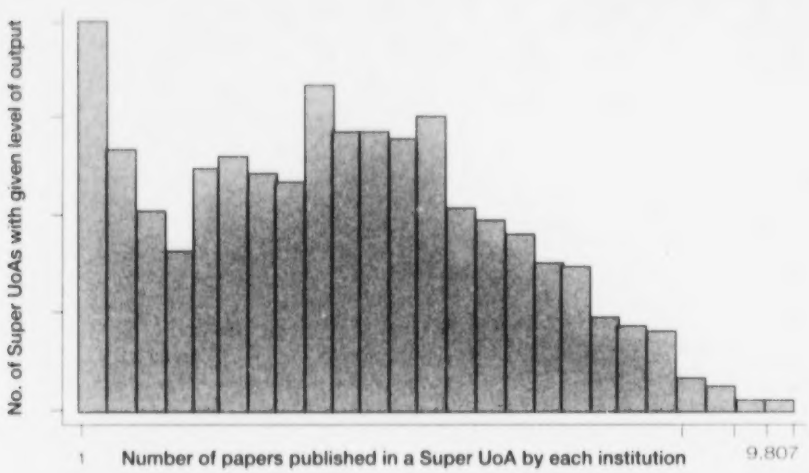
Concentration and critical mass

Figure E1 **Distribution of quality-related (QR) research funding between institutions following the 1992 and 1996 RAEs**



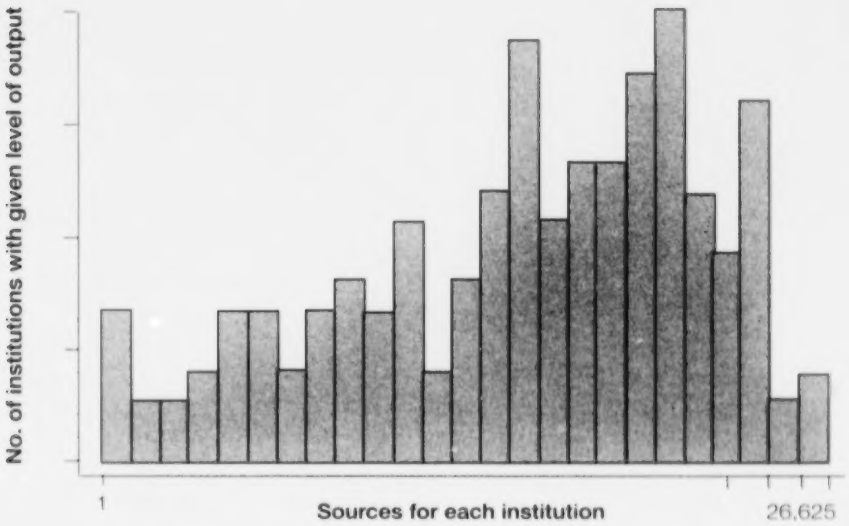
Each point on the X axis represents a separate institution, with its total HEFCE grant for research shown on the Y axis. It is clear from this graph that the vast majority of funds go to a small number of universities: 75 per cent of QR went to 28 of the 105 institutions which in 1997-98 received any significant element of QR funding (that is, more than £250,000). These 28 universities account for 68 per cent of research volume (that is, staff submitted to the RAE).

Figure E2 **Frequency distribution of the number of papers produced from institutions, at the Super UoA level**



This figure shows the number of super units of assessment (see Table G3) within HEIs recording a given level of published output. Output is described in terms of 25 equally sized 'bins'. Taking into account the very low output from specialist institutions, the pattern approximates to a normal distribution.

Figure E3 **Frequency distribution of the number of papers produced from institutions**



When the analysis giving rise to Figure E2 is repeated at the whole institution level, it is clear that the distribution is skewed: there are more institutions with high output levels than might be expected. This argues that high-output areas are co-located within certain institutions, the skew resulting from the additive effect of high-output areas in a relatively small number of institutions. However, the finding that institutions tend to have few high-output areas or many high-output areas, rather than a mix of high- and low-output areas, does not in itself demonstrate that 'critical mass' effects are at work.

Figure E4 **Relationship between ranked bibliometric impact (at the Super UoA level) against total output – UK**

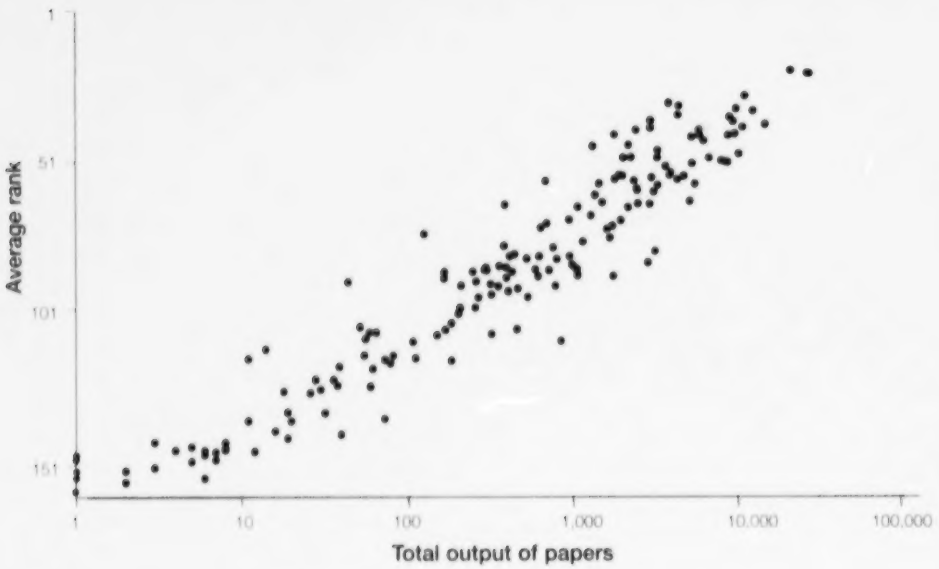
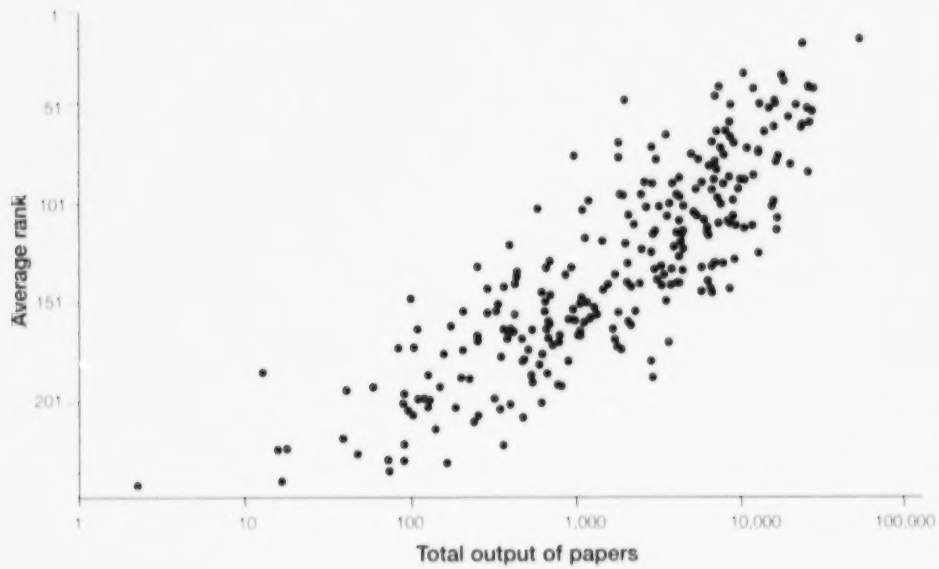


Figure E5 **Relationship between ranked bibliometric impact (at the Super UoA level) against total output – US**



To explore the role of critical mass, HEPU looked at the relationship between the level of output and bibliometric impact, at the Super UoA level. It is clear from the figures above that, both in the UK and the US, bibliometric impact – shown on the Y axis as ranked by HEPU – is correlated with level of output. However, there is considerable variance, indicating that the relationship is not predictive (see Figures E6 and E7). There is greater variance in the US: this may indicate the positive effect of the RAE in improving the quality of UK research, and at the same time increasing the level of strategic focus, thus reducing the tendency to proliferate papers with low impact.

Figure E6 **Size versus impact at the Super UoA level**

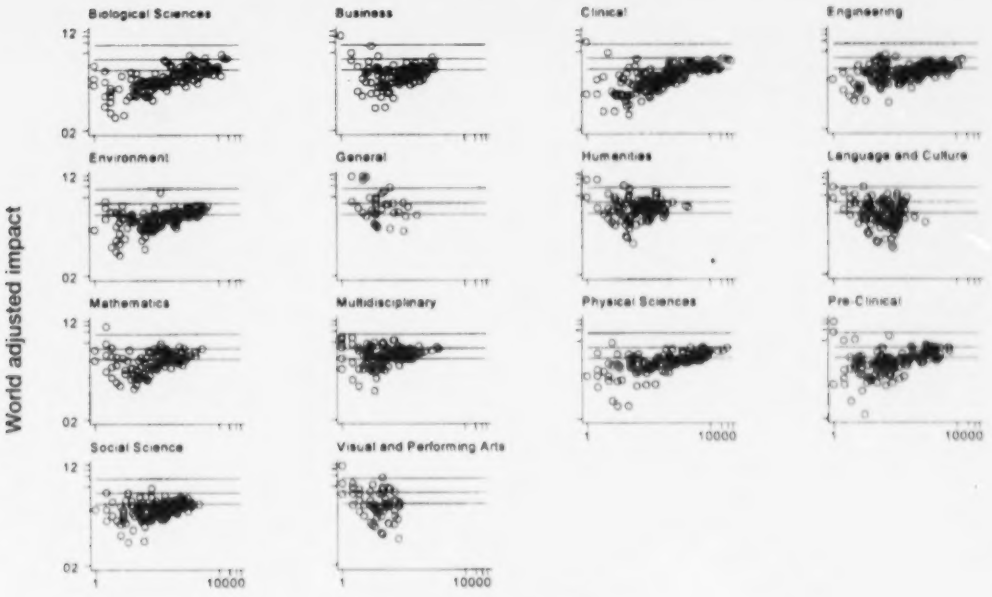


Figure E7 **Size versus impact for institutional Super UoAs performing at above the world average**

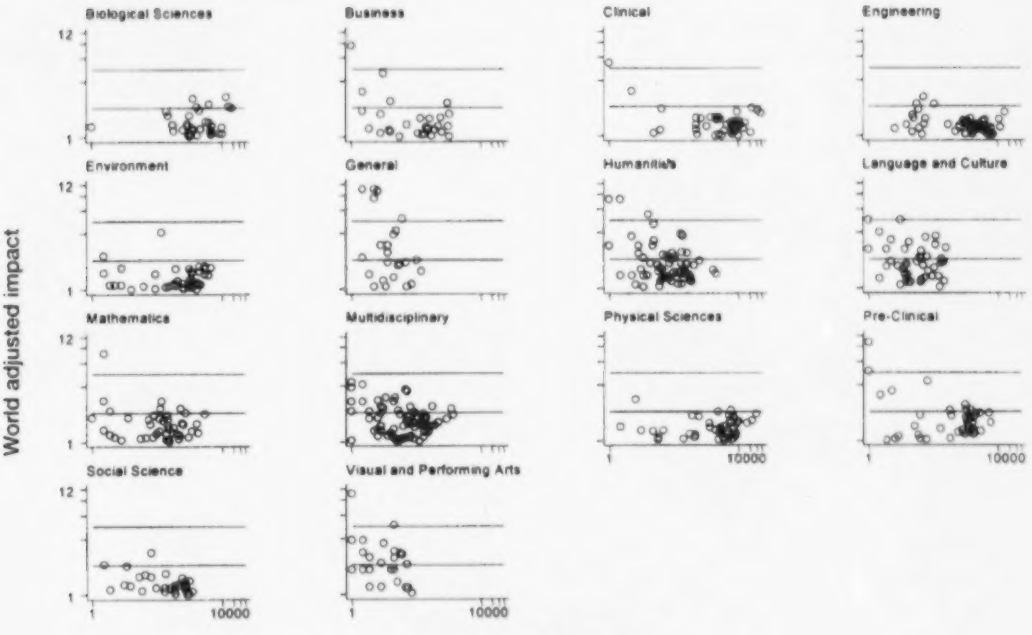


Figure E6 shows 'size' (number of sources, at the Super UoA level) on the X axis plotted against impact (against the world average) on the Y axis. Figure E7 shows the same information, with the same X axis scaling, but only for those institutions performing at above the world average (that is, the Y axis begins at 1). The data for those institutions above world average impact (Figure E7) does not show such a strong relationship between size and performance. This is evidence that in many subject areas there are small departments performing at the very highest levels.

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Annex F

Relationship between teaching, and research, and proposals for research training

Table F1 **Benefits for teaching from research**

Direct knowledge-led. High quality research can provide very clear benefits to student learning, for instance through exposure to a curriculum informed by knowledge at the cutting-edge. This benefit is most often held to occur (and is perhaps most direct and effective) in postgraduate teaching and in the later years of undergraduate courses in the 'scientific' or laboratory-based disciplines
Direct culture-led. This may be seen as the benefit from exposing students to the spirit of enquiry and the research method, to the search for and analysis of data, and the consequent development of their capacity to advance and defend theories and to subject ideas to critical analysis. This benefit is as clear in the arts, humanities and social sciences as in the natural sciences
Indirect resource-based. Teaching can benefit from sharing the resources provided for research, from the role of research in attracting high calibre staff to institutions and departments, and the generally beneficial impact on reputation and resources which research can bring to departments and institutions

Teaching benefits from a range of research and scholarly activity. This beneficial synergy works in a variety of ways in different disciplines and institutions, but three main mechanisms have been identified. We consider that developing an improved research profile can have direct benefits for teaching, and that the ability of institutions to offer research facilities and opportunities for their staff is an important and pervasive indirect benefit. However, the JM Consulting study on the interactions between research, teaching and other activities suggests that institutional policies to promote synergies are patchy and variable in effectiveness. There is little evidence that HEFCE policies have promoted research at the expense of teaching. Rather higher education is continuing to achieve significant increases in productivity, and this is at least in part a function of the generally synergistic relationship between teaching and research. However, there is some concern that a further increase in productivity cannot be achieved without radical change.

Table F2 **New studentships held in a calendar year by source of studentship (England)**

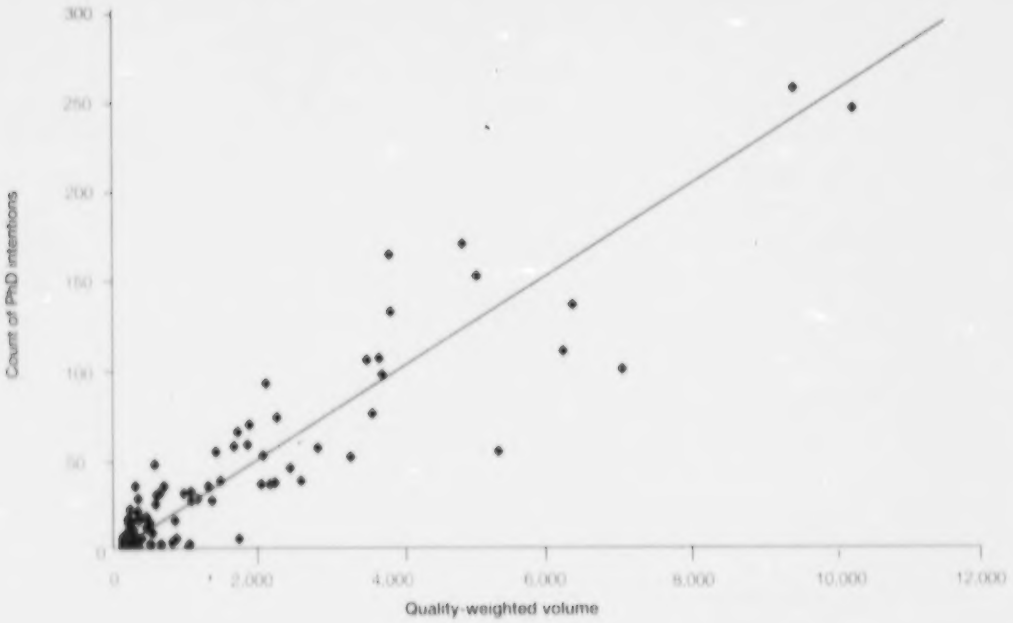
Source of studentship	1988	1989	1990	1991	1992	1993	1994	1995
Research Councils	3,434	3,674	4,328	4,046	4,116	4,184	4,265	4,497
UK-based charities	467	510	555	634	586	630	711	684
UK central Government	1,096	1,088	1,072	993	1,133	1,227	1,199	1,132
UK local authorities, health and hospital authorities	343	333	283	296	294	374	404	519
UK industry, commerce and public corporations	618	771	756	926	999	991	1,093	1,183
Institutional self-funded	n/a	n/a	n/a	n/a	2,255	3,614	3,752	4,301
Overseas	1,700	1,751	1,847	1,954	1,931	2,174	2,309	2,106
Other	895	991	1,115	1,291	470	581	488	598
Total	**8,552**	**9,117**	**9,956**	**10,139**	**11,784**	**13,775**	**14,221**	**15,020**

Table F3 **Estimated new PGR studentships (using student FTEs) by source of funding (for England)**

Source of studentship	1994-95	1995-96	1996-97	1997-98	1998-99
Research Councils	3,361	3,892	3,552	3,428	3,585
UK-based charities	288	443	459	467	643
UK central Government	1,059	1,277	1,058	915	1,092
UK local authorities, health and hospital authorities	99	73	78	52	64
UK industry, commerce and public corporations	1,049	1,242	1,315	1,495	1,652
Institutional self-funded	6,703	7,862	8,066	7,797	8,431
Overseas	1,522	1,506	1,607	1,303	1,339
Other	0	343	552	608	682
Total	**14,081**	**16,638**	**16,686**	**16,064**	**17,489**

One consequence of the increasing emphasis on research has been an increasing eagerness on the part of institutions to recruit postgraduates, both taught and research. There are currently 62,300 postgraduate research students in England. The major area of growth is in the number of institutionally-funded studentships. There was substantial growth after the elimination of the binary line between universities and polytechnics in 1992, but this stabilised prior to the 1996 RAE and the number has remained roughly constant since. The statistics show that this growth has occurred throughout the sector, with a similar rate of increase in both pre- and post-1992 institutions, so it is probably related, at least in part, to the funding incentives provided by the HEFCE's research funding model.

Figure F2 **Effect of research intensiveness on PhD intentions 1994-95**



There is some evidence that relatively small amounts of research funding can be significant in prompting students to consider a research career. This figure shows HESA data on PhD intentions against research funding. As expected, there is a general correlation at high levels of research intensiveness, but there is also a clear relationship at low levels of research funding – maybe even a disproportionate propensity of students in some institutions to consider going on to a research career. It may be argued that if these low levels of funding were withdrawn these students would be lost to the world of research.

Table F4 **Reasons for establishing collaborative arrangements to enable institutions to meet agreed minimum standards for research training**

Increasingly the range of research skills and experiences students require cannot be supplied by a single thesis supervisor; this holds true just as much in the arts and humanities as in the sciences
There are significant economies of scale in the delivery of research training, particularly for the generic skills acquired early in the training experience
Increasingly, globalisation requires that students' training experiences expose them to world-class facilities and world-class researchers
There is an increasing need to teach supervisory skills, and this may be facilitated by collaboration

We are concerned that the rapid expansion of postgraduate research activity in the sector, coupled with the determination of many institutions to develop their research profile, in some cases from a very low base, has resulted in an inappropriate dispersal of postgraduate research trainees. As a result, some of these trainees are isolated, lack

physical and intellectual support, and do not receive a level of training that prepares them for a career either in academe or outside it. Responses to the call for evidence shared our concerns, and showed widespread support for a move towards greater concentration of research training. Our concern is to balance the legitimate aspiration of institutions to develop their research capability with the rights of students to receive appropriate research training.

Table F5 **Provisional criteria for collaborative models to enhance research training**

Assist young researchers up to and including their first established post, although focused on postgraduate researchers
Be sensitive to the different research training cultures and career progression pathways in different disciplines
Avoid reinforcing disciplinary boundaries
Facilitate the concentration of training activities, in order to achieve critical mass
Impact on institutional practice, providing opportunities and incentives for best practice to be shared
Consider the effects of the model on 'barriers to entry' to postgraduate research provision, because of potential knock-on effects on selectivity

We have devoted considerable attention to considering what mechanisms and structures could be developed to enhance the development of research people. The criteria detailed above are those that we believe are essential for an effective and efficient approach.

Table F6 **Options for developing enhanced research training and career development**

Method	Advantages	Disadvantages
Add responsibility for PGR training to the remit of the Learning and Teaching Support Network (LTSN)	Disciplinary basis. Makes use of existing networks and integrates PGR training with advances in L&T generally. Does not divide research from L&T or undergraduates from postgraduates; will tend to be the same academic staff in institutions who teach and supervise all groups	LTSN already has ambitious remit. Centres have been established without PGR work among their aims. Does not address the question of research careers more broadly
Programme modelled on the Integrative Graduate Education and Research Training (IGERT) Programme of the National Science Foundation (NSF)	Model already in use in the US. Integrates researcher development with the development of multidisciplinary research fields. Fosters collaboration both between and within institutions	Creates a new initiative. The model seems more appropriate to Research Council than funding body use. Funding is awarded for up to five years, but because it is associated with a particular research programme, improved practice may not become embedded in the institution
Create new subject centres on the model of the existing LTSN, to form a research training support network	Disciplinary basis. Creates new centres focused on the specific goals of PGR and researcher development	Creates new initiative. But model is proven and allows institutions to identify and implement the most appropriate arrangements to enhance the research training experience
Direct collaborations between similar departments (the Scotdoc model)	Disciplinary and regional basis makes for strong links. Local management based on academic and institutional autonomy rather than a centrally-directed programme	A diverse web of collaborative arrangements would be needed. Difficult to ensure that all were well managed and effective, also difficult to ensure that all PGRs were included in such schemes. Not clear how well such arrangements would work if the partners were seen as unequal. Unclear what level of additional financial support is required
Create collaborative graduate schools through funding constraints and incentives (hub and spoke model)	Creates clear hub and spoke models and economies of scale. Synergy from breadth and depth of environment will definitely enhance student experience. Eliminates students' sense of isolation. Critical mass creates basis for infrastructural investment in student support facilities	Clustering will always exclude some specialised sources of supervisory input. Lone scholar tradition still strong in some disciplines. There may be sectoral consequences depending on how it is implemented. Unclear to what extent these entities could be truly 'collaborative'. May be difficult for part-time students to access

We consider that three of these five options could meet the requirements detailed in Table F5: research training support networks, collaborative graduate schools, and the Scotdoc model. We believe that there is some benefit in allowing institutions to choose which approach is best for them, given their particular circumstances. It would then be the role of the HEFCE to establish minimum criteria and assess the outcome of the provision against these criteria. Such a process would need to be related to the RAE, but could be separate from it.

Annex G

Selectivity and the characteristics of excellence

Table G1 **Proposed characteristics of excellence**

Production of knowledge at the leading edge
Value to users
Commercial exploitation
Diversity of funding sources
Sustainability

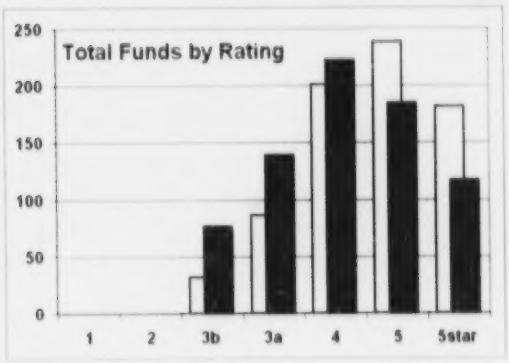
The sub-group looking at selectivity recommended that the characteristics of excellence of different disciplines should be recognised to a greater extent. It provisionally identified the parameters above, which have in common the concept of impact, either on the discipline itself or on others. Recognition on the world stage might be an indicator of excellence in some disciplines, such as particle physics, but not necessarily or exclusively so in others, such as medicine where the concern might also be for excellent research to meet national needs. Concern was noted that in some disciplines (such as architecture) world-class practitioners may not currently be attracted into the academic profession because it was perceived that RAE panels used rather narrow and outdated definitions of excellence.

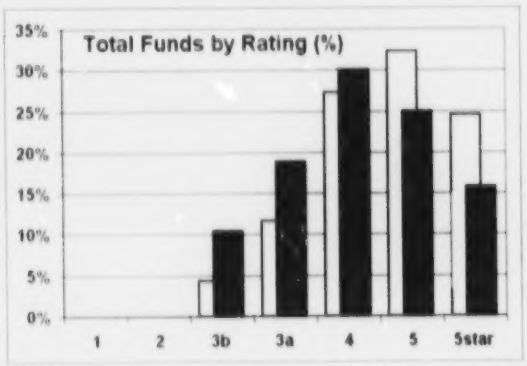
Table G2 **Interviewees' definitions of a centre of excellence**

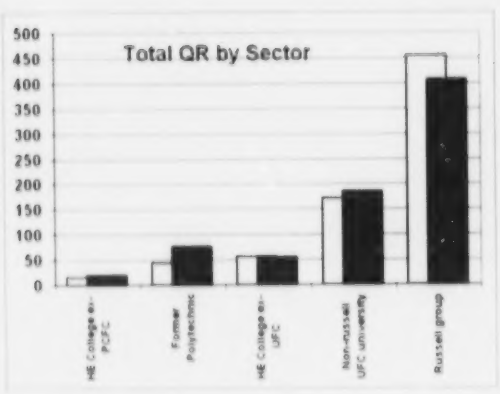
Entities to which scholars and researchers would be attracted on an international basis
A critical mass of researchers and activity
A stimulating research culture, a 'buzz'
Client satisfaction; 'repeat business'; being seen by industry as the think tank
High esteem from peer group, seen as setting a benchmark
At the cutting edge in identifying and undertaking work which pushes back the disciplinary boundaries, rather than just filling in the gaps in knowledge

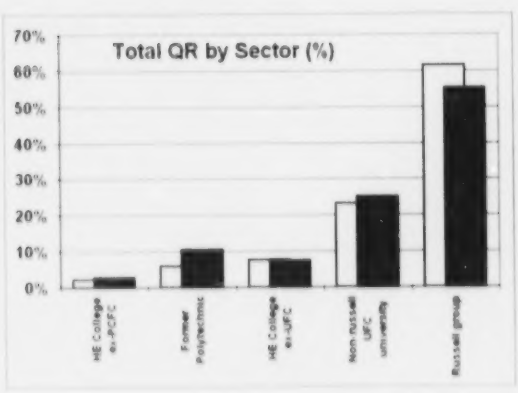
Excellence or a centre of excellence in UK terms could be defined as a unit graded at 5 or 5* in more than one RAE. However, this is a narrow definition. In interviews with HEPU, researchers found excellence hard to define and often reinterpreted it in synonyms. Centres of excellence were considered to be more readily definable, but generally this was couched in terms of exemplars. The characteristics of specific institutions, departments, or research groups were usually cited (they tend to be seen in concrete terms rather than in a network or virtual sense).

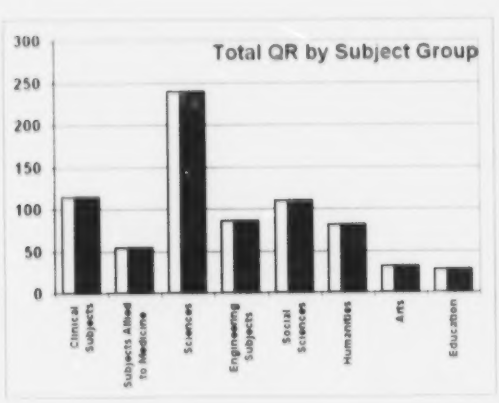
Figure G1a **Scenario A: all quality ratings 3b and above funded at the same rate**

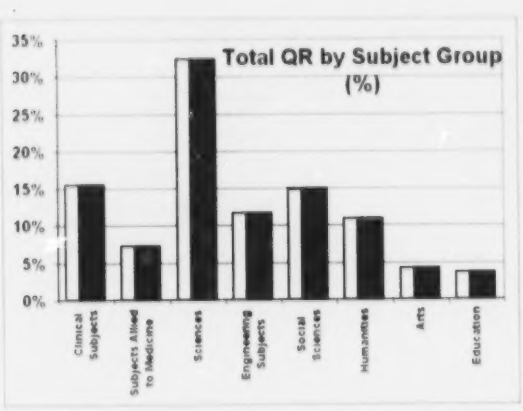


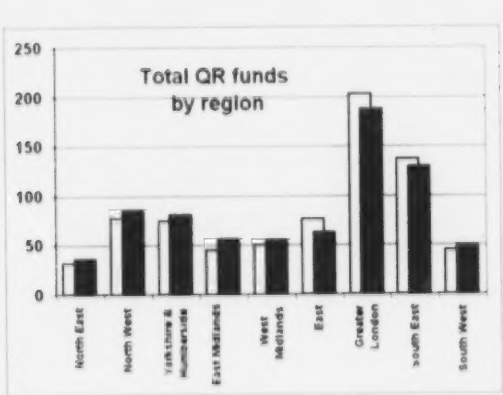












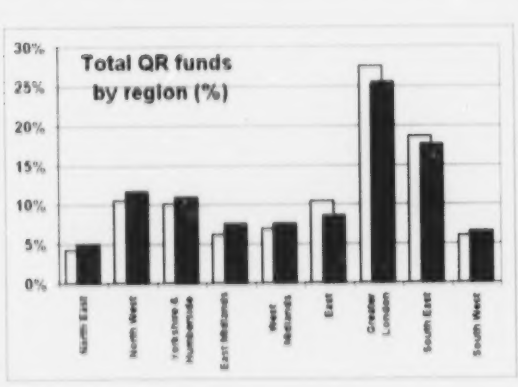


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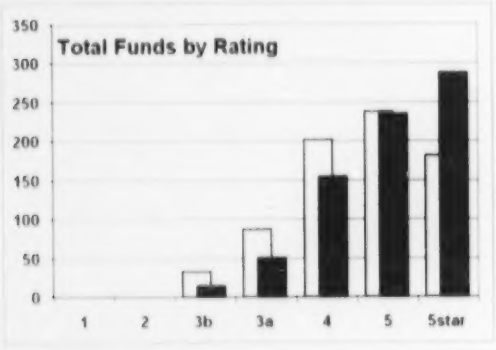
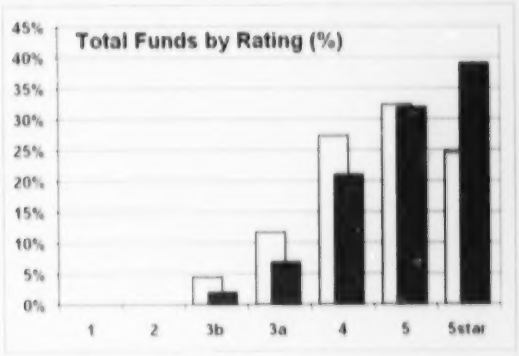
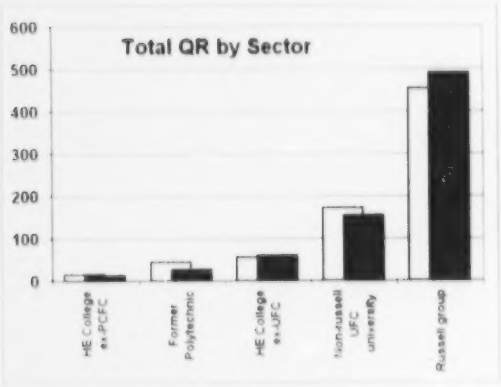
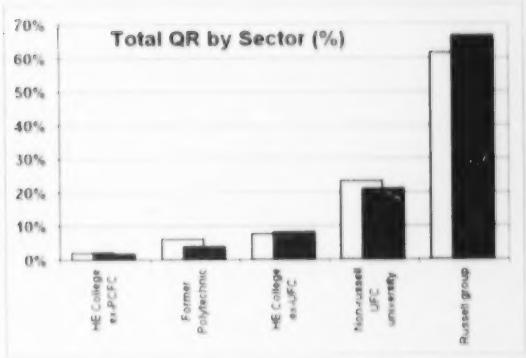
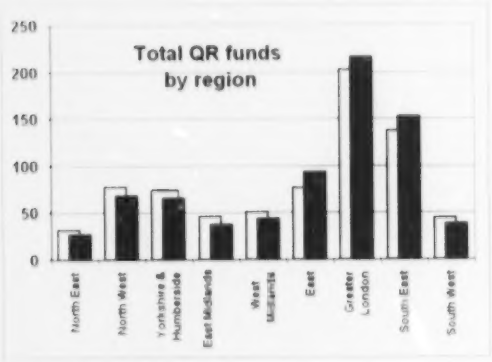
Figure G1b **Scenario H: 100% increments from 3b to 5***

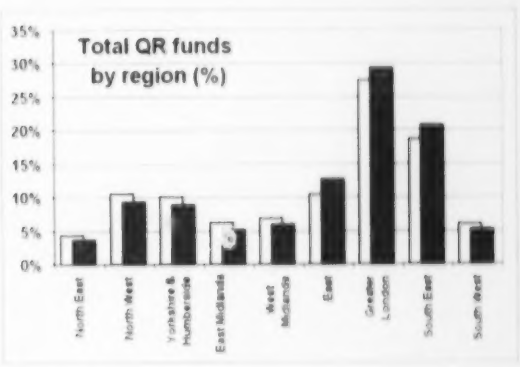


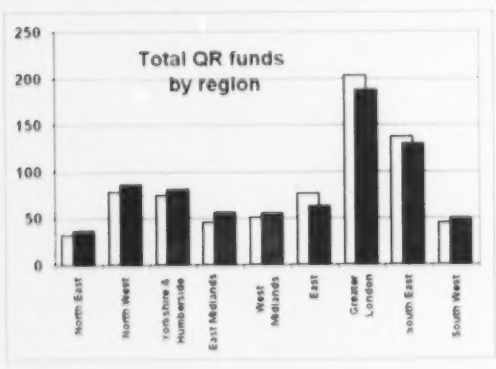


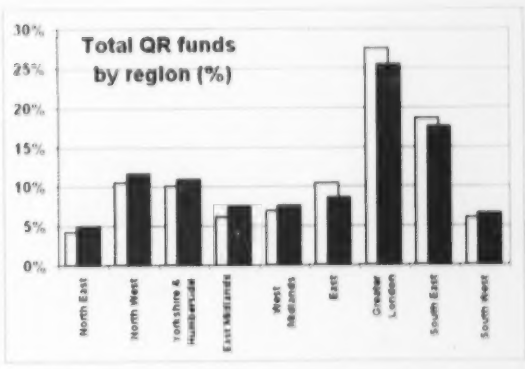










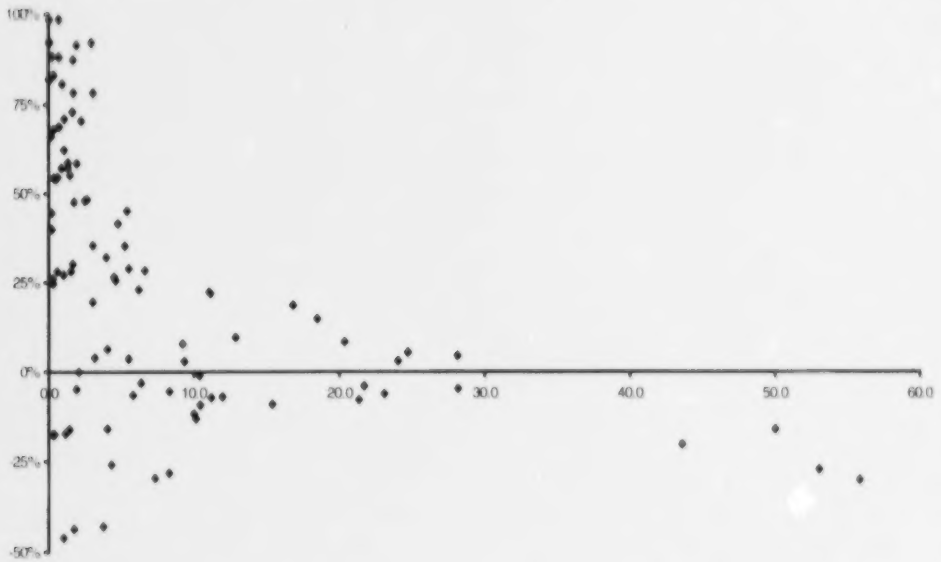


These graphs show the effect of the most selective and least selective funding scenarios that were explored – in terms of the movement from the current distribution (light grey bar) to the modelled distribution (dark grey bar) by region, by sub-sector ('Russell Group' institutions, other institutions formerly funded by the Universities Funding Council (UFC), formerly UFC-funded colleges, former polytechnics and other institutions formerly funded by the Polytechnics and Colleges Funding Council) and by RAE rating. Each chart is presented by

absolute value and by percentage. The effect on quality-related (QR) funding allocations to individual institutions of these two scenarios is also shown, plotted against current QR, in the scatter-graphs following the histograms.

Figures G2a and G2b **The effect on individual QR allocations to institutions of the least selective method (Scenario A) and most selective (Scenario H), plotted against current QR (£ millions). Each point represents an HEI.**

Proportional change in QR versus current, under scenario A by HEI



Proportional change in QR versus current, under scenario H by HEI

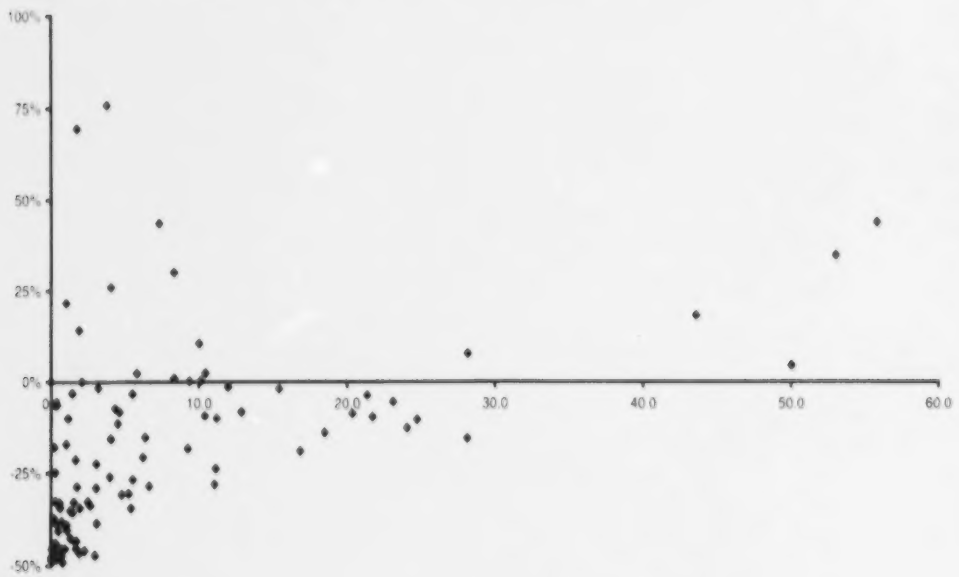


Table G3 **Mapping of units of assessment (UoAs) to Super UoAs**

Proposed macro grouping	Super UoA	HEPU grouping based on bibliometric similarity	Unit of assessment	HESA subjects
Medical and health	S1	Clinical	Clinical Laboratory Sciences	1 Medicine and dentistry
	S1	Clinical	Community-Based Clinical Subjects	2 Subjects allied to medicine
	S1	Clinical	Hospital-Based Clinical Subjects	1 Medicine and dentistry
	S1	Clinical	Clinical Dentistry	1 Medicine and dentistry
	S1	Clinical	Psychology	3 Biological sciences
Biomedical sciences	S2	Pre-clinical	Pre-Clinical Studies	2 Subjects allied to medicine
	S2	Pre-clinical	Anatomy	2 Subjects allied to medicine
	S2	Pre-clinical	Physiology	2 Subjects allied to medicine
	S2	Pre-clinical	Pharmacology	2 Subjects allied to medicine
	S2	Pre-clinical	Pharmacy	2 Subjects allied to medicine
	S2	Pre-clinical	Other Studies and Professions Allied to Medicine	2 Subjects allied to medicine
	S3	Biological sciences	Biochemistry	3 Biological sciences
	S3	Biological sciences	Biological Sciences	3 Biological sciences
	S3	Biological sciences	Agriculture	5 Agriculture and related
	S3	Biological sciences	Food Science and Technology	5 Agriculture and related
	S3	Biological sciences	Veterinary Science	4 Veterinary sciences
Science	S4	Environment	Earth Sciences	6 Physical sciences
	S4	Environment	Environmental Sciences	6 Physical sciences
	S4	Environment	Geography	6 Physical sciences
	S5	Mathematics	Pure Mathematics	7 Mathematics
	S5	Mathematics	Applied Mathematics	7 Mathematics
	S5	Mathematics	Statistics and Operational Research	7 Mathematics
	S6	Physical sciences	Chemistry	6 Physical sciences
	S6	Physical sciences	Physics	6 Physical sciences
	S6	Physical sciences	Metallurgy and Materials	6 Physical sciences
Engineering	S7	Engineering	Computer Science	8 Computer science
	S7	Engineering	General Engineering	9 Engineering and technology
	S7	Engineering	Chemical Engineering	9 Engineering and technology
	S7	Engineering	Civil Engineering	9 Engineering and technology
	S7	Engineering	Electrical and Electronic Engineering	9 Engineering and technology
	S7	Engineering	Mechanical, Aeronautical and Manufacturing Engineering	9 Engineering and technology
	S7	Engineering	Mineral and Mining Engineering	9 Engineering and technology
	S7	Engineering	Built Environment	10 Architecture, building and planning
Social and economic sciences	S8	Social science	Town and Country Planning	10 Architecture, building and planning
	S8	Social science	Law	12 Law
	S8	Social science	Politics and International Studies	11 Social, economic and political studies
	S8	Social science	Social Policy and Administration	11 Social, economic and political studies
	S8	Social science	Social Work	11 Social, economic and political studies
	S8	Social science	Sociology	11 Social, economic and political studies
	S8	Social science	Nursing	2 Subjects allied to medicine
	S8	Social science	Education	18 Education
	S8	Social science	Sports Related Subjects	18 Education
	S9	Business	Economics and Econometrics	13 Business and administrative studies
	S9	Business	Business and Management Studies	13 Business and administrative studies
	S9	Business	Accountancy	13 Business and administrative studies

Proposed macro grouping	Super UoA	HEPU grouping based on bibliometric similarity	Unit of assessment	HESA subjects
Arts and humanities	S10	Language and culture	Library and Information Management	14 Librarianship
	S10	Language and culture	Anthropology	15 Languages
	S10	Language and culture	American Studies (Canada, the Caribbean, Latin America and the USA)	15 Languages
	S10	Language and culture	Middle Eastern and African Studies	15 Languages
	S10	Language and culture	Asian Studies	15 Languages
	S10	Language and culture	European Studies	15 Languages
	S10	Language and culture	Celtic Studies	15 Languages
	S10	Language and culture	English Language and Literature	15 Languages
	S10	Language and culture	French	15 Languages
	S10	Language and culture	German, Dutch and Scandinavian Languages	15 Languages
	S10	Language and culture	Italian	15 Languages
	S10	Language and culture	Russian, Slavonic and East European Languages	15 Languages
	S10	Language and culture	Iberian and Latin American Languages	15 Languages
	S10	Language and culture	Linguistics	15 Languages
	S11	Humanities	Classics, Ancient History, Byzantine and Modern Greek Studies	15 Languages
	S11	Humanities	Archaeology	16 Humanities
	S11	Humanities	History	16 Humanities
	S11	Humanities	History of Art, Architecture and Design	16 Humanities
	S11	Humanities	Philosophy	16 Humanities
	S11	Humanities	Theology, Divinity and Religious Studies	16 Humanities
	S12	Visual & performing art	Art and Design	17 Creative arts and design
	S12	Visual & performing art	Communication, Cultural and Media Studies	17 Creative arts and design
	S12	Visual & performing art	Drama, Dance and Performing Arts	17 Creative arts and design
	S12	Visual & performing art	Music	17 Creative arts and design

These 'super units of assessment' were developed by the Higher Education Policy Unit, University of Leeds, in their study 'Benchmarking the International Standard of Research in England'. These are groups of UoAs based on bibliometric similarity.

Table G4 **Key conclusions of the HEPU study on the effect of selectivity**

The explicit policy of selectivity, underpinned by the RAE, has produced major changes in attitude and strategy, and has increased the active management of the research environment. Direct management of detailed research strategy is still rare and is considered by interviewees generally to be unproductive in the context of higher education research.
The RAE and the consequential selectivity of funding have operated as major stimuli to more conscious research management, and proved an effective lever to institutional change, although some change would have occurred anyway.
Selectivity and the RAE have also acted as incentives to improve research training since HEIs have recognised the need to develop their research potential. Research training has improved as a result of increases in the financial and management resources devoted to it and through the adoption of more systematic approaches.
Selective approaches to funding and research management are as widely accepted in the social sciences and humanities as among the natural sciences.
Institutions have established structures that ensure better financial and management accountability, and which permit the development of more strategic approaches to research policy (for example, research committees at both institution and department level).

Table G5 **Comparison of the level of selectivity in the UK compared with the US: total public funding and proportion of funding to top decile**

	UK		US	
1980-81	£205 million	46.5%	$4.2 billion	47%
1997-98	£1.75 billion	56.9%	$12.75 billion	43%

Annex H

Changes in the research landscape including the growth of interdisciplinary and multidisciplinary research and collaboration

Tables H1 and H2 **Number and percentage of collaborative papers published by UK researchers per year from 1981 to 1994**

H1 Number of collaborative papers

Sector	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Total
Education	5,728	6,050	6,244	6,598	7,263	7,537	8,111	8,341	8,834	9,763	10,562	12,183	12,626	13,814	123,654
Medical	3,016	3,101	3,269	3,466	3,887	3,924	4,116	4,296	4,674	4,997	5,102	5,749	5,942	6,108	61,647
Research Council	1,315	1,418	1,573	1,622	1,685	1,887	1,961	1,964	2,035	2,303	2,348	2,646	2,703	2,851	28,311
Industry	899	979	1,080	1,045	1,156	1,173	1,340	1,426	1,522	1,705	1,809	1,976	2,063	2,125	20,298
Government	432	404	442	453	485	527	520	565	568	685	709	772	815	833	8,210
Non-profit	204	252	274	329	328	329	358	391	412	506	512	647	606	718	5,866
Unknown	40	45	46	66	60	43	48	57	61	46	102	103	98	141	956
Total	**8,659**	**9,088**	**9,537**	**10,059**	**10,970**	**11,375**	**12,058**	**12,567**	**13,417**	**14,732**	**15,674**	**17,904**	**18,418**	**19,814**	**184,272**

H2 Percentage of sector papers

Sector	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Total
Education	31	32	33	35	35	37	39	41	42	44	46	49	49	50	41
Medical	40	40	41	42	42	43	44	44	46	47	48	50	52	53	46
Research Council	37	39	40	44	42	44	50	52	53	56	58	61	61	65	50
Industry	35	38	40	40	42	44	50	49	51	54	57	58	62	63	50
Government	31	32	33	37	37	39	41	45	45	51	51	53	55	55	43
Non-profit	42	45	48	52	53	52	57	57	58	60	60	68	65	71	58
Unknown	37	32	34	46	44	41	52	52	54	51	63	58	63	65	51
Total	**28**	**29**	**29**	**31**	**31**	**33**	**35**	**36**	**38**	**40**	**41**	**44**	**45**	**46**	**37**

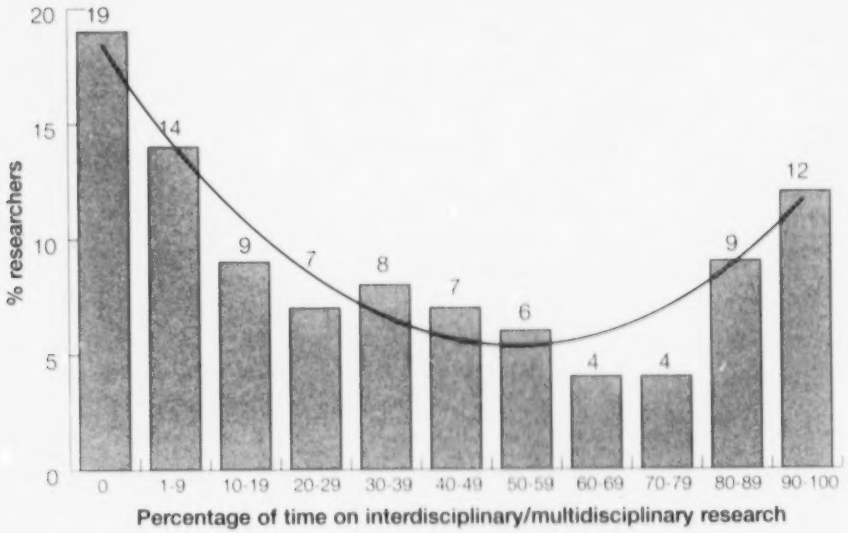
The significant rise in collaborative work indicates that the RAE has not adversely affected collaborative output.

Table H3 **Percentage of internationally co-authored papers for UK researchers compared with those in France, Germany, Italy, Spain and Japan**

	1985	1990	1995
France	20.0	25.7	33.3
Germany	18.4	25.4	32.2
Italy	20.0	26.8	33.0
Spain	13.5	23.5	29.0
Japan	7.1	9.8	14.4
UK	**14.0**	**18.8**	**26.2**

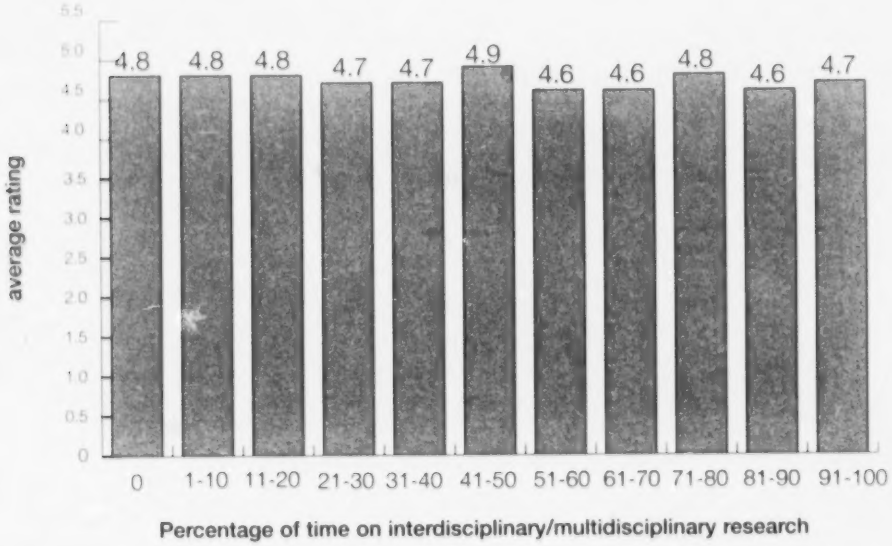
It is clear from this OECD data that UK researchers collaborate extensively with others on an international basis, despite the physical separation from continental Europe.

Figure H1 **Proportion of time that researchers spend in interdisciplinary and/ or multidisciplinary research**



This shows the results of a study undertaken in response to the Dearing report. A questionnaire asked researchers to indicate the amount of time they spent engaged in interdisciplinary or multidisciplinary research. The responses clearly show that almost all researchers consider themselves to be engaged in interdisciplinary and multidisciplinary research to some extent. These data are further confirmed by evidence from the PREST survey of universities and researchers, which showed that 97 per cent of research staff collaborate with researchers from another discipline.

Figure H2 **Relationship between level of interdisciplinarity and RAE rating**



This shows that there is no relationship between the percentage of time researchers spend on interdisciplinary and/or multidisciplinary research and the rating of their 1996 RAE submission.

Table H4 **Changes in the assessment processes for interdisciplinary and multidisciplinary research in the 2001 RAE**

Panels have been assembled so that they cover all key areas, and all include interdisciplinary researchers
Umbrella panels have been established that will provide a forum to discuss cross-boundary work
Panel criteria state explicitly how the assessment of interdisciplinary work will be approached
HEIs are provided with a better opportunity to explain their research structure and how this relates to their submission
Improved mechanism for cross-referral of submissions between panels and for the incorporation of advice received from another panel

Table H5 **Areas where panel behaviour may give rise to concern about the assessment of interdisciplinary and multidisciplinary research**

Where specialised departments in a field are covered by a single panel – for example textiles, paper science, materials and corrosion all fall under materials
Where a view develops in the sector that in order to get the highest ratings a submission must show a breadth of activity within a discipline
When a large area involves more than one discipline, for example 'development' is spread across economics, politics, and sociology

We believe that assessment of interdisciplinary and multidisciplinary research is not prejudiced and can be reconciled with the continuing negative perception in the sector by the findings of the PREST study. This study suggests that the problems cited are not 'general' but relate to the three distinct areas above, and are a function of panel behaviour rather than of the boundaries between units of assessment.

Table H6 **Common themes emerging from an analysis of the changing research landscape**

Continued growth in interdisciplinary research
Increased collaboration internationally in the use of expensive research equipment and infrastructure
Increased involvement of users of research
Further growth in applied research
Growing importance of research teams/groups vis-à-vis departments
Emergence of more virtual research teams and the use of remote data gathering
A further drift towards the short-term nature of research, both in terms of employment contracts and the type of research work undertaken

There were differing views about whether the size of research groups would become a more significant issue. Some believed that, in the case of biosciences, larger teams would become more important, while in other subjects, such as social sciences, the

view was that size may become less important as IT-mediated forms of collaboration increased. A number of interviewees from the arts and humanities believed that the model of the single scholar working on his or her own was gradually dying out in favour of working more collaboratively with other researchers. As a consequence of increased collaboration and joint working, virtually all respondents believed that multi-authorship of research papers would continue to grow. A number of these UK themes are reflected in international trends, according to the report on international approaches to research policy by SPRU.

Annex I

Alternative methods of quality assessment and related potential changes

Table I1 **Alternative assessment mechanisms and other potential changes – strengths and weaknesses**

Alternative	Strengths	Weaknesses
Use of formula based on research income and/or publications citations	• Potentially cheap to administer • Transparent • Viability shown in Australia • Grant income based on mix of prospective and non-specific retrospective (track record) judgement	• Requires complex validation/checking which may raise costs • Reduces plurality through dependence upon Research Council decisions • Works best in sciences, probably not at all in arts and humanities • Citations are US-centric and may divert research from UK interests • Citations information may not relate to current activities • May distort activity as researchers seek to boost performance in chosen indicators
Competitive bidding for block funding (as the Joint Infrastructure Fund model)	• Very selective • Accountability built in to funding contract • Model exists in funding for JIF and commercialised national labs (eg. NPL) • Judgement based on mix of prospective and non-specific retrospective (track record) judgement	• High transaction costs in preparing and assessing proposals • Can cause wide fluctuations and instability in institutional income • Contracts may limit scope for innovation and academic freedom
Reputational assessment	• Broadens base of peer review to whole of field • Relatively cheap to administer • Feasible in any subject	• Highly susceptible to prejudice as no specific examination of evidence involved • Open to game playing and collusion • Nominations only likely for most visible, so little discrimination lower down the table • Reputation may persist long after its causes have gone away • No instance of use in significant resource allocation
Freeze on present ratings	• Minimum cost option	• No incentive to improve for new entrants or revamped units • Could induce complacency in highly rated departments • No accountability

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Alternative	Strengths	Weaknesses
Partial further dual support transfer	• More explicit targeting of resources to successful research groups	• Reduced scope for HEIs to deploy funds strategically and to support new areas and emerging excellence • Leaves same transaction costs on either side of divide
Combined teaching and research assessment	• Recognises universities' holistic function • Single administrative effort	• Different criteria applied • Greater tension with interdisciplinary and multidisciplinary research • RAE much lighter demand on administration than Teaching Quality Assessment (TQA) • TQA a rolling programme
Rolling assessments	• Spreads central administrative burden • Could facilitate emergence of distinct processes for science and humanities • Could smooth funding changes	• Makes judgement of cross-disciplinary work harder if only part being assessed • Administrative burden always present in institutions and may require additional staff
Partial RAE, excluding 5/5*-rated	• Reduces burden on those who have demonstrated ability to sustain high performance levels over the long term • Reduces cost	• Need to establish equality of 'new' 5s • Need to ensure 5* funding not diluted by grade-drift • Games playing – loading staff into departments not subject to assessment
Royal Academy of Engineering approach (assessment in five dimensions: mode one research; mode two research; scholarship; strategy; vitality and sustainability)	• Recognises the different dimensions of excellence	• Difficult to implement as a funding basis as currently conceived, because of problems aggregating, or weighting, the different dimensions of excellence

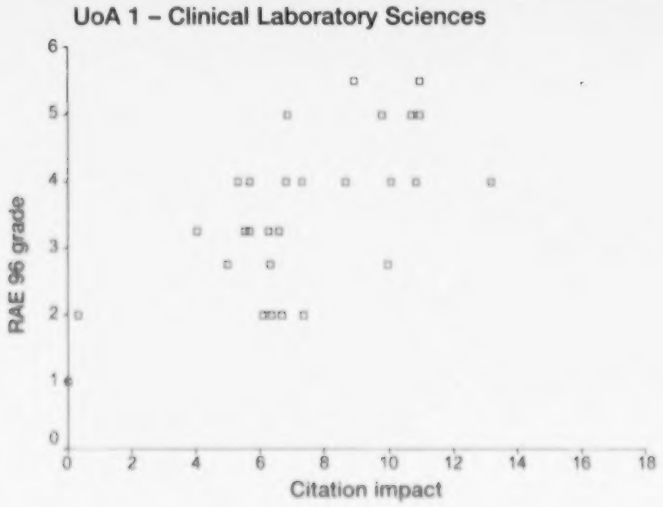
Radical alternatives to the RAE were considered in the course of the review. This table provides some of the relevant evidence. The report of the quality assurance sub-group contains a fuller discussion of the options considered.

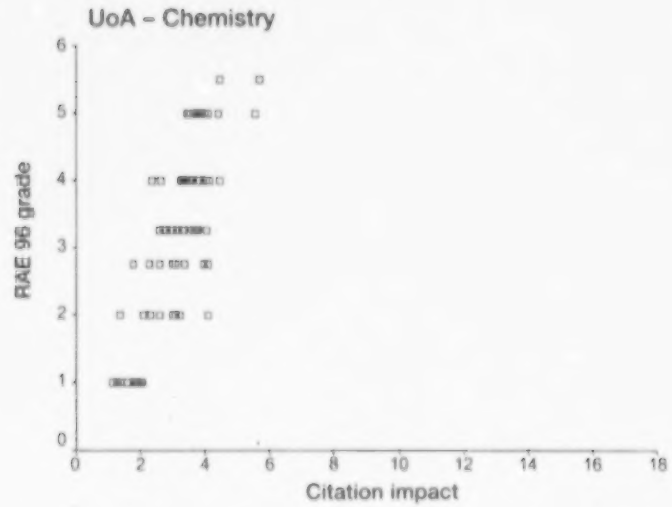
Table I2 **Major changes introduced for the 2001 RAE**

A three-fold increase in user representatives
Enhanced assessment mechanisms for interdisciplinary and multidisciplinary research
International peer review of 5/5* research ratings
Thematic sub-panels
Greater representation of women on panels
Better arrangements for dealing with staff transferring between institutions

The RAE continues to evolve to reflect the growing complexity of the research base and its interactions with stakeholders.

Figure I1 **Relationship between RAE scores and citation impact**





Increasing recognition of the diversity of the characteristics of excellence acknowledges that greater reliance might legitimately be placed on indicators such as income and citations in some disciplines. However, there are concerns that the system might become unstable if it became too self-referential. It may also be the case that, in looking at research income and bibliometric data, the analysis would become more retrospective than at present and would exclude any assessment of those elements held to be of increasing importance – strategy, research culture and research training. Any attempt to employ this simplistically across the spectrum of research activity is likely to lack credibility. There is also a significant concern that such a mechanistic approach might reduce risk taking and the willingness of institutions to invest in emerging talent and areas. The inability of an algorithm based on one or more existing performance indicators to drive the assessment process has been demonstrated by PREST. Their study shows that, although the number of Category A staff entered and the amount of Research Council and charity income per member of research active staff in the department were, in general, statistically significantly correlated with RAE rating, in no instance were they predictive in a meaningful sense – the margin of error was at least plus or minus 1 grade. This figure, which plots citation impact against RAE rating, shows that, even for chemistry – the discipline in which, uniquely, RAE ratings are very strongly correlated with other performance indicators – there is still significant variance; in clinical laboratory sciences the correlation is very poor.

Table I3 **Research evaluation practices in other countries**

No	Country	University research evaluation for allocation of core research funds	Other national evaluation of university research
1	UK	Ex-post informed peer review (RAE)	
2	Hong Kong	Ex-post informed peer review (RAE)	
3	Australia	Ex-post quantitative evaluation based on primary performance indicators	
4	Poland	Peer review + ex-post informed peer evaluation	
5	Slovak Republic	Student numbers moderated by ex-post informed peer review	
6	Denmark	Student numbers/ Performance based	Evaluation of specific research areas
7	Finland	Student numbers/ Ex-post quantitative evaluation	Evaluation of specific research areas
8	New Zealand	Staff and student numbers *	
9	Germany	Staff and student numbers	
10	Italy	Staff and student numbers	
11	Norway	Staff and student numbers	Evaluation of specific research areas
12	Sweden	Staff and student numbers	Evaluation of specific research areas
13	Hungary	Staff and student numbers	
14	Austria	Negotiation	Evaluation of specific research areas
15	France	Negotiation	Comité nationale d'évaluation (CNE) & Centre National de Recherche Scientifique (CNRS) Evaluation
16	The Netherlands	Staff and student numbers	Association of Netherlands Universities (VSNU) research evaluation
17	US	Staff and student numbers	Graduate-Research evaluation
18	Canada	Staff and student numbers	

*It is proposed that from 2000 a portion of core funding for research will be allocated based on peer review.

A full investigation was commissioned of research evaluation methods in use in other countries. This table presents a synopsis of the findings. There is considerable variation in the extent to which research funding is informed by performance:

a) Research funds allocated, at least in part, on the basis of some sort of research evaluation.

Apart from the UK, countries such as Australia, Poland – and China in respect of the Hong Kong-based universities – are determining research allocations based on research performance. In the UK and Hong Kong, the approach is based on informed peer review undertaken for the purposes of determining the allocations, while in Australia and Poland existing performance indicators are used.

b) Formulaic allocation using research performance indicators, but also including parameters related to the size of the teaching and learning activity.

Research funds are allocated together with funding for teaching and learning as part of the general institutional funding. Countries such as Germany, Italy, Sweden and Norway follow this kind of approach. Finland and Denmark allocate the largest share of general research funds on the basis of the amount of teaching and learning activity, but a small portion of core research funding is allocated on the basis of the teaching and research performance of the university.

c) Negotiation between institutions and the government department responsible for university funding.

In Austria this model is applied without undertaking any form of research evaluation, while in France information gleaned from an evaluation of university teaching, research and management activities is taken into account during the negotiation.

There is also a fourth category in which research assessment is carried out, but it does not inform funding decisions. In The Netherlands, evaluation of research performance is used to improve the research quality of the university. Funds are allocated using a formula based on student numbers.

The report from SPRU notes that, although only a small number of countries examined are currently using performance-based approaches to university research funding, most are either in the process of implementing some form of performance-based allocation, or are considering doing so.

Annex J

Effects of the Research Assessment Exercise

Table J1 **Funding changes produced by the 1996 RAE**

Basis of change in funding	Change in funding	Percent change from 1996-97 baseline
Change in rating only	£114 million	19%
Volume changes only	£112 million	19%
Change in pot size only	£62 million	10%
Submissions no longer funded after the 1996 RAE	£31 million	5%

It has been suggested that the cost of the RAE is disproportionate to the benefit as the process does not bring about significant changes in institutional funding. Although this is true at the sub-sectoral level (that is, the aggregate funding for pre-1992 universities, post-1992 universities, and HE colleges) there is significant movement at the institutional level. Also, institutional resource allocation models generally reflect the HEFCE formula to a greater or lesser extent. We have therefore conducted an analysis of allocations to individual subjects in each institution, to get an indication of the level of funding movement brought about by the RAE at departmental level. Changes in RAE ratings consequent on the 1996 and 1992 RAEs are summarised at Tables J2 and J3. Excluding capital funding, we looked at the effect on pre- and post-1996 RAE allocations at the UoA level for each HEI of: QR volume; RAE ratings relative to sector; rate of funding; and QR allocations. The overall 'funding churn' following the 1996 RAE was some 55 per cent of the funding available. Clearly some of the changes will be in opposite directions for a given submission. However, the net effect is still large, with 30 per cent of research funding moving. Even when one removes the effect of factors associated with, but not the result of, the RAE, the 20 per cent movement in total funding is still large, in addition to the 5 per cent change attributable to submissions that were no longer funded.

Table J2 **RAE grade movement from 1989 to 1992**

1992 submissions	1992 rating						
1989 rating	**0**	**1**	**2**	**3**	**4**	**5**	**Total**
0		90	80	106	47	36	359
1	41	13	45	49	10	1	159
2	37	5	107	189	58	8	404
3	31		46	284	176	48	585
4	10		1	72	181	86	350
5	8	1	6	44	143	202	
Grand total	127	108	280	706	516	322	**2,059**

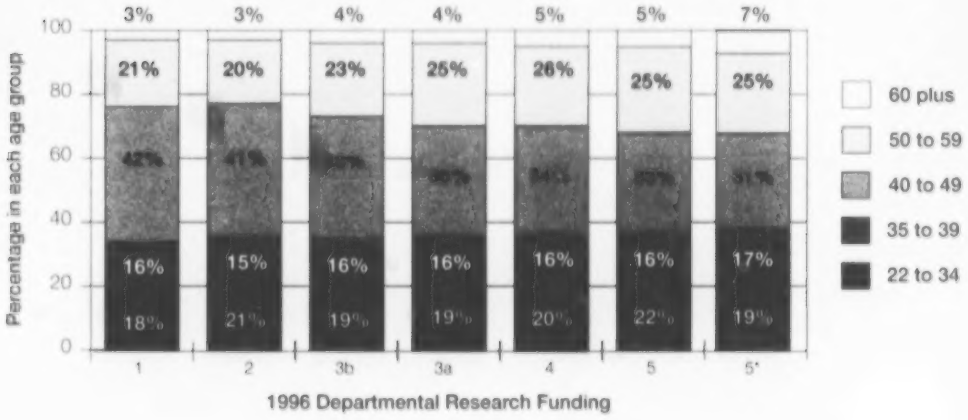
Improved rating in 1992	1,029	50.0%
Same rating in 1992	728	35.4%
Decreased rating in 1992	175	8.5%
Dropped out after 1989	127	6.2%

Table J3 **RAE grade movement from 1992 to 1996**

1996 submissions	1996 rating							
1992 rating	0	1	2	3	4	5	5*	Total
0		126	207	131	30	14	7	515
1	180	78	84	60	2		1	405
2	87	28	130	290	44	4		583
3	64	2	36	370	271	54	5	802
4	13			79	254	162	22	530
5	6			4	43	150	120	323
Grand total	350	234	457	934	644	384	155	**3,158**

Improved rating in 1996	1,634	51.7%
Same rating in 1996	982	31.1%
Decreased rating in 1996	192	6.1%
Dropped out after 1992	350	11.1%

Figure J1 **Age profile of researchers by departmental research ratings**
(Extracts from the 1996 RAE database)



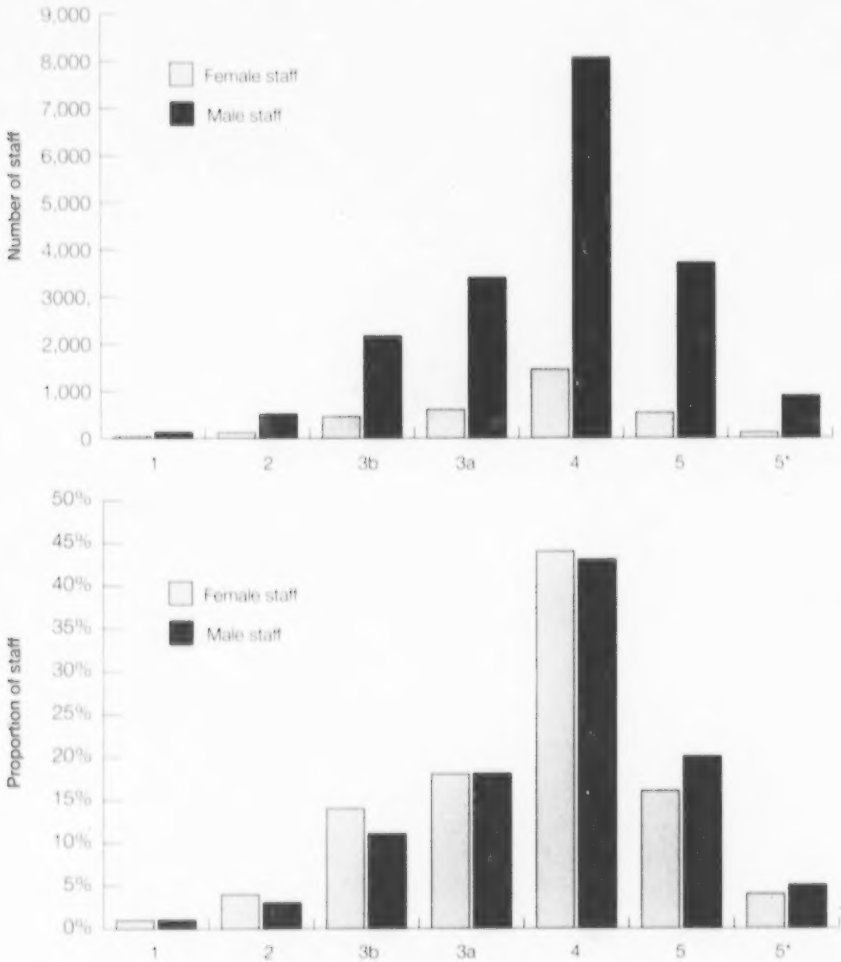
Interviews evidenced some concern about the effect of the RAE on the recruitment of new researchers. In particular it was suggested that the RAE is raising the typical age of recruitment from mid-20s to early 30s as a result of a requirement for appointees to have four publications, especially in the latter half of the RAE cycle. However, the age of staff submitted to the 1996 RAE shows no relationship between the age profile of departments and RAE grades, which would be expected if such a phenomenon was having a significant effect.

Table J4 **Ratio of proportion of young researchers recruited to research-intensive departments to proportion recruited to the sector overall**

	1996-97	1997-98	1998-99
Young recruits in research (Yr)	748	730	786
Total recruits in research (Tr)	3,088	3,076	3,646
All young recruits (Y)	1,224	1,314	1,317
Total recruits (T)	5,720	6,267	7,163
Ratio [Yr/Tr] / [Y/T]	1.13	1.13	1.17

A direct analysis of the age profile of staff recruited to research-intensive departments, compared with the overall age profile of staff recruited, shows no evidence of discrimination in the recruitment of younger staff. In fact, research-intensive departments recruit a slightly higher than average ratio of younger staff.

Figure J2 **Distribution of male and female staff by RAE grade**



A further concern often expressed is that the RAE may discriminate against women. The patterns of distribution of researchers by RAE grade are broadly similar for women and men, though the numbers of women are dramatically lower. Further analysis of gender and ethnicity issues is being undertaken by the sub-group on the development of research people.

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Table J5 **International journal editors' views, and analysis of the effect of the RAE on publication behaviour**

No promotion of volume overall
Global change to shorter sharper publications
Small timing effect prior to RAE
No evidence of 'crowding out' of publications
No evidence of a fall in quality from 'salami slicing'
Need to recognise value of editorship and systematic reviews more explicitly as indicators of quality

The PREST survey of editors shows that the RAE affects publishing behaviour, but not significantly, and notes that there is no evidence of UK researchers increasing or 'salami slicing' publications with consequent deleterious effect on quality. Instead, there appears to be a global trend for shorter and sharper articles. However, a view voiced by some editors is that the RAE deters review articles and refereeing – partly due to a belief that insufficient credit is being given to these activities. The funding bodies need to ensure that all HE research-related activities are properly incorporated in the quality assessment process, and they need to take responsibility for communicating to the academic communities that this will occur.

Table J6 **Effect of the RAE on staff movement and retirement**

Small effect on timing
Non-research active staff move more
No differences depending on seniority
No disadvantage to young staff
Low compared with US
Low compared with commercial levels
Possibly too low to support a dynamic system

The PREST study found a widespread belief that there is an active staff transfer market, and that the RAE is at least partially responsible for it. Given that the promotion of a transfer market is one of the most often cited negatives of the RAE, the effect of the RAE on staff movement was explored in detail.

Analysis of the 1996 RAE database showed an increase in the staff moving in the year immediately before the RAE; this was less than 500 staff out of the total recorded research active staff population at the time of 50,430. On this basis, the RAE could be said to be associated with, at most, the movement of 1 per cent of the research active staff population during a period when the sector grew by 25 per cent. Using HESA data we found that the percentage of staff moving to another academic institution is significantly larger for staff not returned to the RAE than for staff who were returned to the RAE for the years 1994-95, 1995-96 and 1996-97. Also, the percentage of research active staff moving to another institution in the year after the 1996 RAE was significantly higher than in the two years before it.

Analysis demonstrated that for the three years 1995-96, 1996-97 and 1997-98 research-intensive departments had a lower or equivalent ratio of people recruited from outside the institution moving into senior posts (professors and senior lecturers) than the sector average. Again, this seems to us to confound the notion that the RAE drives undesirable levels of staff movement. The main driver of staff movement appears to be the increasing emphasis on the development of effective research strategies in an increasingly competitive arena, which is a global phenomenon, though the RAE may bring this more sharply into focus. This view is confirmed by the US experience, where there are a number of studies showing that, particularly in some areas, there is substantial staff movement. In addition, interviewees have suggested that staff mobility was higher in the 1970s than it became in the 1980s.

Annex K

Sustaining the project/infrastructure balance and potential changes to the funding model

Table K1 **Sources of research funding for UK HEIs**

	1984	1991	1997
Funding bodies	58.8%	47.8%	35.1%
Research Councils	17.2%	20.3%	24.1%
Other government departments	7.5%	6.4%	10.4%
UK industry	5.6%	6%	7%
Overseas	n/a	5.5%	8.5%
Charities	6.7%	11%	13.6%
Other	n/a	3%	1.3%
Total (£ millions)	**859**	**1,989**	**2,942**

The growth in project funding has significantly outstripped that for infrastructure from the higher education funding bodies, leading to an increasing project effort being dependent on a declining infrastructure base.

Table K2 **Proportion of HEFCE funding determined by the volume weighting factor for charitable funding**

	1997-98	1998-99	1999-2000	2000-01
Income which HEIs receive from charities, as it feeds into the QR model (average of the last two years, £)	270,634,162	294,305,842	317,760,251	340,129,289
HEFCE QR funds attributable to HEIs' income from charities (£)	52,711,280	60,341,353	69,451,165	74,252,518
Total HEFCE mainstream QR funds (£)	684,000,000	714,378,894	737,696,702	748,394,812
HEFCE funds attributable to HEIs' income from charities as a proportion of total HEFCE mainstream QR funding	7.7%	8.4%	9.4%	9.9%

At present, uniquely among external sources of income, income from charities is taken into account in the volume measure, both for establishing the budgets for subject areas, and for determining the volume of research in each institution. This is a recognition of the distinct nature of funding from charities, and enables the HEFCE to contribute towards the costs incurred by institutions when carrying out research sponsored by charities. Around £75 million is allocated to institutions each year according to the weighting factor for charity income in the HEFCE's research funding method. The increasing volume of charitable research funding means that the charities measure is becoming an increasingly significant fraction of the volume measure, which has consequences for the distribution of funds between institutions and between subjects. However, this approach provides an obvious incentive to grow volume. We believe that the extent to which HEFCE should provide this additional support should be related to the contribution that charities make to the direct costs associated with the projects they sponsor, rather than by featuring as a volume measure in the funding model.

Table K3 **Effect on HEFCE funding of moving to a flat rate overhead for charities income**

Price band	HEFCE mainstream QR funds attributable to HEIs' income from charities (£)	Income which HEIs receive from charities – average of the last two years as used in QR model (£)	Rate of funding per £ of income received from charities (£)
A	69,571,705	310,707,817	0.22
B	1,873,688	9,600,180	0.20
C	2,807,125	19,821,292	0.14
Total	**74,252,518**	**340,129,289**	**0.22**

By virtue of appearing as a volume measure, charities income becomes quality weighted. This table shows the effects of moving to a flat rate for the support of charitable research funding. A more detailed discussion of these issues can be found in the report of the sub-group on the nature and purpose of HEFCE research funding.

Annex L

Glossary of terms

AHRB	Arts and Humanities Research Board.
Block grant	The main characteristic of HEFCE grant is that it is allocated not to individual researchers or research groups, but to the institution and provided for use at its discretion without explicit project activity in mind. Such an approach maximises institutions' flexibility and allows them to optimise the activities supported by their various streams of funding.
Capability development	In the review, 'capability development' has been taken to mean developing the skills base, equipment and methodology to do the following: undertake research in new areas; develop those areas which are not traditionally strong, or where activity is distributed; and to develop areas where users are not well defined and may be unable to engage effectively with the research market.
CollR	Collaborative research funding awarded to ex-PCFC institutions after the 1996 RAE to support the development of research, particularly through collaboration.
Concentration	A policy of concentration limits research funds to a certain number of defined institutions. Current HEFCE policy is to fund the best research wherever it may be found; this has had the effect of concentrating funds in a few institutions, but concentration was an effect of the policy not the policy itself.
Critical mass	A certain level of research activity at which substantial improvements in research quality can be expected.
Dual support	Public funding for research in higher education is delivered through the four HE funding bodies and the Research Councils. The dual support principle lays down that the Research Councils support the costs of particular projects, while the funding bodies support the capability necessary to complete these projects.
GR	Generic Research funding, introduced in response to the theme of wealth creation in the 1993 Science and Technology White Paper 'Realising our Potential'. Allocations are made in proportion to institutions' GR qualifying income. Qualifying income is the total received from users of research for collaborative projects where the institution retains the intellectual property and publication rights to the research.
HEROBC	Higher Education Reach-out to Business and the Community Fund.
HESA	Higher Education Statistics Agency.
Impact	In bibliometrics, a measure of research quality based on the number of times a journal article is cited elsewhere in the academic literature.
JIF	Joint Infrastructure Fund.
JREI	Joint Research Equipment Initiative.

Policy factor	Total amounts of research funding for each subject are calculated solely on objective criteria. In 1999 the HEFCE considered introducing a policy factor to reflect judgements about the differing importance of different disciplines. This proposal was rejected by the sector as both the proposed methodology and principle were considered to be flawed.
QR	The HEFCE's main stream for research funding; in 1998-99, QR (quality-related) funding was £804 million (97.6 per cent of total research funding). QR funding is distributed on the basis of quality ratings generated through the RAE.
Quanta	In calculating the level of funding for each subject, each subject is assigned to one of three cost weights and these are multiplied by the volume of research in each subject to work out the total funding available for distribution in that subject.
RCI	Research Careers Initiative.
Research	For the purposes of this review, research is taken to mean activity which pushes forward the frontiers of knowledge, whether it be in sciences, technology, arts, humanities or the social sciences. Commonly this will involve making new discoveries, but, particularly in the humanities, it may involve reinterpreting and developing fresh insights from existing knowledge such as systematic reviews.
Russell Group	The Russell Group is an informal self-selected representative body for 19 research-led institutions (the Universities of Birmingham, Bristol, Cambridge, Cardiff, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham, Oxford, Sheffield, Southampton and Warwick; Imperial College of Science, Technology and Medicine, King's College London, London School of Economics and Political Science, and University College London). Although it has no special status as a body in Funding Council deliberations, the group is a well recognised entity in the sector and beyond, and approximates to a 'top twenty' in terms of Funding Council research grant.
Scholarship	In the context of the review, scholarship is taken to mean being sufficiently alert to developments in the subject, including new discoveries, and interpreting and reinterpreting the knowledge base of the subject to inform teaching.
Selectivity	The HEFCE policy of selectivity provides increasing amounts of funding for units producing the highest quality research.
Volume	Volume of research in the HEFCE funding model is calculated chiefly on the basis of a count of full-time equivalent research active staff supported from institutional general funds. There are in addition minor volume measures that add to the total volume calculated; the most significant of these is postgraduate research student numbers.

Annex M

Consultation questions

Recommendation 1: The HEFCE should continue to allocate research funds selectively, by subject, on the basis of the quality of research, and should not seek to concentrate funding in a limited number of institutions (see paragraphs 77-84).

Question 1: Do you agree that the HEFCE should continue to fund selectively on the basis of quality?

Recommendation 2: The degree of selectivity should aim to balance the need to enable world-class research to flourish, with the need to enable new subjects and new areas of excellence to develop (see paragraphs 85-89).

Question 2: Do you agree with the aim of balancing support for existing excellence with opportunity for new areas of excellence to develop?

Recommendation 3: Considerations of 'critical mass' should not play a part in decisions about allocations by the HEFCE (see paragraphs 90-92).

Question 3: Do you agree that considerations of 'critical mass' should play no part in the funding decisions of the HEFCE?

Recommendation 4: The HEFCE should aim to increase the amount of research funding available for distribution as QR, in order to allow improving departments to benefit and the funding for 5 and 5* departments to be maintained. If this should prove impossible, then the Council should pitch the degree of selectivity to protect the funding of top-rated departments (see paragraphs 93-95).

Question 4: Do you agree with the intention to protect top-rated departments?

Recommendation 5: Funding should be retained for 3a and 3b rated submissions (see paragraph 96).

Question 5: Do you agree that funding should be retained for both 3a and 3b rated departments?

Recommendation 6: Consideration should be given to providing specific funding to high performing units in English HEIs to enable collaboration with centres of excellence overseas (see paragraphs 97-100).

Question 6: Do you agree that there is a need for specific funding to high-performing units in English HEIs to enable collaboration with centres of excellence overseas?

Recommendation 7: We recommend that there should be no more, but not significantly fewer, than the present number of units of assessment (see paragraphs 101-105).

Question 7a: Do you agree that there should be no more than the current number of units of assessment?

Question 7b: Do you agree that there should not be significantly fewer than the current number of units of assessment?

Recommendation 8: The HEFCE should continue to allocate its QR research funding between subjects formulaically and should not seek to exercise policy judgements about this (see paragraphs 106-116).

Question 8: In 1998, following a consultation process, the HEFCE rejected the introduction of a 'policy factor' which would have weighted funding towards priority subject areas. Do you agree that a policy factor should not be introduced?

Recommendation 9: The HEFCE should regularly review the relative costs of different subjects, and make any necessary adjustments to the price bands in the funding method (see paragraph 117).

Question 9: Do you agree that there is a case for regular review of the pricing bands in the research funding method?

Recommendation 10: The HEFCE should take into account in determining subject budgets the relatively lower level of project funds provided to arts and humanities subjects by the AHRB, compared with the grants from Research Councils to other subjects (see paragraphs 118-119).

Question 10: Do you agree that the level of project funds available in the arts and humanities should be taken into account in determining subject budgets (quanta)?

Recommendation 11: Further consideration should be given to whether the AHRB should be formally established as a Research Council (see paragraph 120).

Question 11: Do you agree that there is a case for the AHRB being formally established as a Research Council?

Recommendation 12: The HEFCE should ensure that its funding and assessment processes do not inhibit collaboration, and should consider whether to provide support for specific research networks; but there is no case for explicit funding for collaborative research activity in general (see paragraphs 121-123).

Question 12a: Are there ways in which you believe the HEFCE's funding and assessment methodologies inhibit collaboration?

Question 12b: Should the HEFCE provide support for specific research networks?

Question 12c: Is there a general case for explicit funding for collaborative research activity?

Recommendation 13: There should continue to be a research assessment process, based on peer review, that builds on the solid and accepted foundations of the RAE. (see paragraphs 124-130).

Question 13: Should there continue to be a research assessment process based on peer review, building on the foundations of the RAE?

Recommendation 14: Efforts should be made at all levels to provide information about the workings of the RAE (see paragraphs 131-134).

Recommendation 15: The HEFCE should work to ensure that the sector understands the criteria used in making judgements in the RAE, and has confidence that these will be adhered to by the panels (see paragraph 135).

Question 14/15: Do you agree that further efforts are needed to ensure that the sector understands the RAE process, and particularly the criteria used by panels?

Recommendation 16: The quality of research should continue to be the sole basis for assessment in the RAE, but the HEFCE should continue to consider means to ensure that applicable research is fairly assessed (see paragraphs 146-147).

Question 16: Do you agree that quality of research should continue to be the sole basis for assessment in the RAE?

Recommendation 17: The RAE process should recognise that different disciplines have different characteristics of excellence, and panels should be able to make their judgements drawing on evidence provided specifically for their discipline. The criteria adopted should continue to be transparent (see paragraphs 148-151).

Question 17: Do you agree that RAE panels should recognise to a greater extent that different disciplines have different characteristics of excellence?

Recommendation 18: Where combinations of disciplines are judged to have given rise to a new discipline, and it has achieved maturity, then consideration should be given to creating a new unit of assessment (see paragraphs 152-154).

Question 18: Do you agree that a new unit of assessment should be considered only after a new discipline has both emerged and achieved maturity?

Recommendation 19: The HEFCE should discontinue GR and should build on HEROBC to encourage higher education institutions to engage with industry (see paragraphs 155-163).

Question 19: Do you agree that the HEFCE should discontinue GR funding?

Recommendation 20: The funds provided by the HEFCE and the DTI for HEROBC should be increased substantially, and mechanisms established for the targeted distribution of these funds (see paragraphs 155-166).

Question 20: Do you agree that mechanisms should be established for the targeted distribution of HEROBC funds?

Recommendation 21: Scholarship is an activity which is distinct from research and should be required of all academics who teach (see paragraphs 155-158 and 168-170).

Question 21a: Do you agree that scholarship is an activity that can be distinguished from research?

Question 21b: Do you agree that scholarship should be required of all academics who teach?

Recommendation 22: The HEFCE should make it clear that its funds for teaching include an element intended to enable staff to engage in scholarship (see paragraphs 155-158 and 168-170).

Question 22: Do you agree that funds for teaching are the right source of support for scholarship?

Recommendation 23: The HEFCE should ensure that its funding mechanisms encourage research not only at international levels of excellence, but also at local, regional and national levels (see paragraphs 176-180).

Question 23: Do you agree that HEFCE funding should encourage research of local, regional and national importance, as well as research of international excellence?

Recommendation 24: The HEFCE should create a new stream of funding to supplement the existing researcher-driven and user-driven funds. This 'capability-development' funding should be provided to institutions in response to proposals for their use (see paragraphs 176-186).

Question 24: Do you agree that a new stream of capability-development funding should be developed?

Recommendation 25: The HEFCE should consider ways of modifying its funding method to remove incentives to recruit research staff and students at the expense of appropriate investment in research infrastructure (see paragraphs 187-190).

Question 25: Do you agree that the HEFCE should modify its funding method to remove incentives to recruit staff and students at the expense of infrastructure?

Recommendation 26: The HEFCE should no longer include an element which recognises income from charities in calculating the total funding for each subject, but should instead agree an explicit basis of support that reflects the contribution by charities to the direct costs associated with projects (see paragraphs 191-192).

Question 26: Do you agree that charitable income should be removed from the volume measure, and charitable grants should instead be supported on an agreed, explicit basis?

Recommendation 27: The HEFCE should consider whether it is necessary to amend the funding model to explicitly recognise that funding provided as EU grants and contracts currently does not cover all the costs associated with the project (see paragraphs 193-194).

Question 27: Should the HEFCE amend the funding model to take account of the basis on which EU funding is provided?

Recommendation 28: In general, institutions should charge prices which cover at least the full cost of research which they carry out under contract (see paragraph 195).

Question 28: Do you agree that institutions should be expected, in general, to charge prices which at least cover the cost of research they carry out under contract?

Recommendation 29: Additional funds should be provided annually by the Government for research infrastructure, and these should be earmarked for this purpose when allocated by the HEFCE to institutions (see paragraphs 196-197).

Question 29: Do you agree that additional capital funds should be provided annually by the Government for research infrastructure, and these should be earmarked for this purpose when allocated by the HEFCE to institutions?

Recommendation 30: The HEFCE should consider earmarking specifically for infrastructure investment a proportion of QR funding provided to institutions (see paragraph 198).

Question 30: Do you agree with the principle that a proportion of QR should be earmarked specifically for infrastructure investment by the HEFCE?

Recommendation 31: The HEFCE should consider, initially through the human resources sub-group, the reasons behind the relative under-representation of women in the highest-rated departments, and whether other groups appear not to be realising their full research potential (see paragraphs 201-205).

Question 31: Do you agree that the HEFCE should explore further the reasons behind the relative under-representation of women in the highest-rated departments, and whether other groups are failing to realise their full research potential?

Recommendation 32: Submissions to the RAE should be allowed to include personal statements in respect of staff for whom, for whatever reason, a normal contribution to the standard form of submission is not appropriate (see paragraphs 206-207).

Question 32: Do you agree that personal statements should be permitted in a future RAE for those staff for whom a standard submission is not appropriate?

Recommendation 33: Research training should be the subject of a separate, but linked, assessment process to the RAE (see paragraphs 208-215).

Recommendation 34: Funding provided by the HEFCE for the training of research students should be calculated and allocated separately from the funding provided for research (see paragraphs 208-215).

Recommendation 35: The HEFCE, together with the Research Councils and other stakeholders such as industry and charities, should develop minimum requirements which departments would need to satisfy in order to be eligible for HEFCE funding for postgraduate research student training. The research assessment process should be extended to establish whether departments comply with these minimum standards. (see paragraphs 208-218).

Question 33: Do you agree that research training should be the subject of a separate assessment process, linked to the RAE?

Question 34: Do you agree that funding for the training of research students ought to be separated from funding for research?

Question 35: Do you agree that the HEFCE should develop and implement minimum standards for the delivery of postgraduate research programmes?

Recommendation 36: Collaborative arrangements should be established to enable units to meet all aspects of the postgraduate research training requirements, which might not be able to do so alone. The HEFCE should separately work up the practical arrangements to implement this recommendation (see paragraphs 208-218).

Question 36: Do you agree that the HEFCE should facilitate collaboration between institutions to support the delivery of postgraduate research programmes?

Recommendation 37: The proposed capability-development stream of funding should be employed to ensure adequate PhD output in all subjects (see paragraphs 176-186 and 220-221).

Question 37a: Do you agree that there is a case for taking steps to ensure adequate PhD output in certain subjects?

Question 37b: Do you agree that the proposed capability-development funding stream is the appropriate mechanism for ensuring adequate PhD output?

Recommendation 38: Institutions should be required to submit a staff development strategy as a precondition for the release of research funding (see paragraphs 222-228).

Question 38: Do you agree that institutions should be required to submit a staff development strategy as a condition for the receipt of research funding?

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90